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Volume II Number 7
January, 1983
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The Monthly Magazine for Color Computer Users

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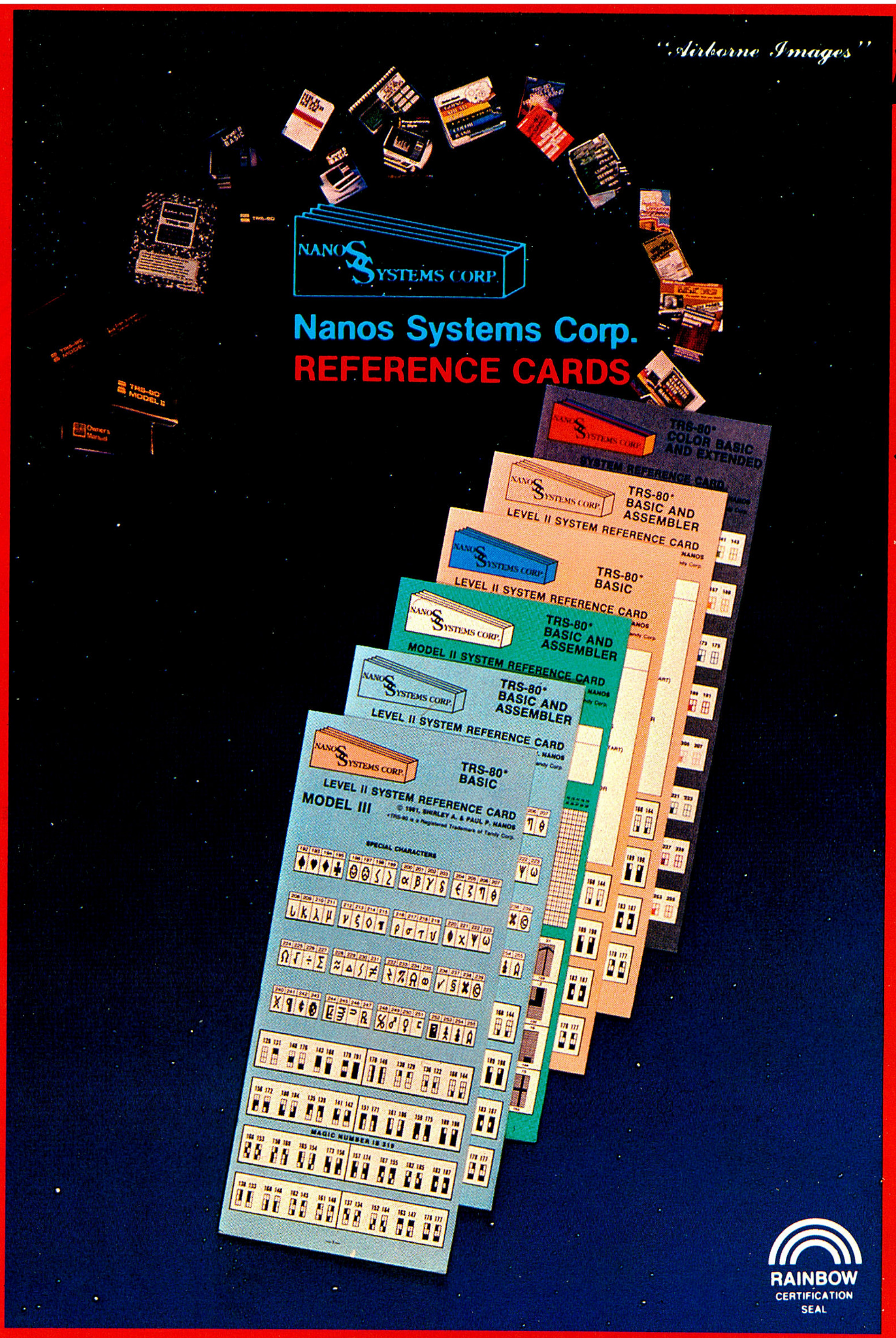
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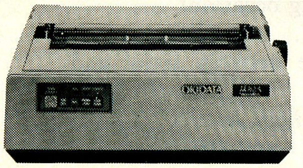

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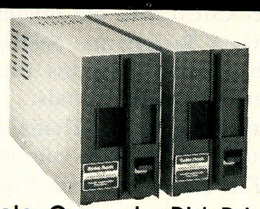

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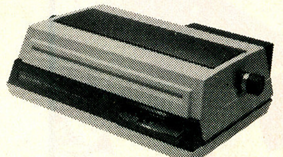

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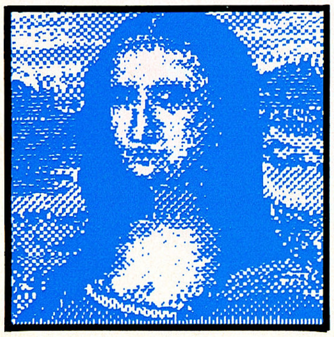
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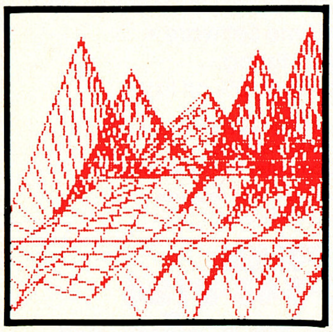
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With programs and a tutorial

NEXT MONTH: Our favorite biology professor, Dr. Lane Lester, will dissect your income tax and provide a program that will help you do your own on CoCo.

Also, a really great program that will allow you to control the speed your listings scroll on the screen by using your joystick.

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Limited back issues are available for U.S. $2 for numbers 1-7 (January, 1982), U.S. $2.50 for numbers 8-14 (August, 1982) and U.S. $2.95 for 15 upward except October, 1982, which is out of print. Shipping and handling costs of $3.50 must be added for UPS (please furnish street address only) or U.S. $6 for U.S. Mail (and to points outside the United States). Payment accepted by VISA, MasterCard, Cash, Check or Money Order in United States currency only.

letters to RAINBOW

KUDOS FOR US

Editor:

I have watched in utter amazement as *the Rainbow* has continued to grow and become *the* resource for the CoCo. My only complaint is that it has grown so fat that I simply cannot absorb all the information you publish in just one month.

I have never written to a magazine before, but I think (and hope) that you know that I am but one of many who must tell you every month what a great publication yours is. It is "the Bible" of the Color Computer world and I am pleased, as one of your initial subscribers, that I was able to—in effect—be in on the "creation."

The Rainbow isn't just the best Color Computer magazine I've ever seen. I think it's the best computer magazine I've ever been fortunate enough to read.

I know a lot of others feel this way. How come you don't print more letters from them in your *Letters* column? You should get your share of praise, too. I can't believe you get only a few laudatory letters every month.

James Charles
Manchester, NH

Editor's Note: I guess we blush and say many thanks, Mr. Charles. But, to answer your question, we *do* get quite a number of letters which say good things about *the Rainbow* and we print some of them, but nothing like all of them. The staff here very much appreciates *all* your good thoughts. But, frankly, we try to make our *Letters* column a source of news and information exchange—not a "puff place" for the magazine.

KEEP THE MACHINE OILED

Editor:

This is to express my extreme satisfaction with "Charlie's Machine."

Thanks to Mr. Roslund's *Minimon* and *Auto Repeat* programs, I have learned much more about the workings of the Color Computer. The programs in this column are among the few which I take the time to type in. I look forward each month to reading his column and hope that it will continue to provide readers with a glimpse at machine language programming.

Anthony Byorick
Biloxi, MS

HEAT'S ON AGAIN

Editor:

Please add my name to the list of all others who have asked for a "Beginner's" column in your fantastic magazine.

A beginner's question: How long can you turn on—and turn off—an 80C without any harm to the machine?

Yves Bourgon
Lauzon, Quebec

Editor's Note: As to how long you can keep CoCo on, look at the letter below, but we would not advise it. There shouldn't be a practical limit to the amount of time you can keep it on—in terms of your use. We would not keep it on for days and days, though.

As to the beginner's column, see Dick White's new *Bits and Bytes* this month and Joe Kolar's *Basic Training*, which began last month.

Editor:

I keep reading about heat problems with CoCo, and ads for LEDs to tell you when it's on or off. I've had my CoCo for about two years, and the only time it's shut off is when I go on vacation. I have the Radio Shack 32K upgrade, no disk, and have never had a problem with my machine.

Given the facts, what reason would there be to shut it off after each use?

Your magazine is great, keep up the good work.

Arnold Brager
Las Vegas, NV

A LOT OF BARRELS

Editor:

I have scored 112,500 points on *DUNKEY MUNKEY* and I was wondering if anybody has a score that beats that score.

Jarrod Hollinghead
Biloxi, MS

A RAINBOW INDEX?

Editor:

When my husband and I bought our 80C last winter we knew that there wasn't a great deal of software available. We also realized that it would be only a matter of time until the software was written. We were delighted to discover your magazine and are thrilled with the progress it has made in a year.

Is there any plan to include an index in one issue a year that would cover the year past? If not, we plan to use the *UNIDATFL* program which was in your June issue to index articles and programs for our own use.

Thank you for a great magazine.

Barbara Gill
Remlik, VA

Editor's Note: We *do* plan an index one of these days. Honestly, we have been so busy publishing the magazine that we just have not had time for an index. But we will. In the meantime, we understand that the *UNIDATFL* program sold commercially includes an index to *the Rainbow*, at least for the first year.

HAT'S OFF FOR HELP

Editor:

Some good news!

One of your loyal readers saw the article on Color Disk Scripsit and figured out the problems I was having with my printer and the program.

My hat is off to Mr. Gordon Black of Pittsburgh, Pa. Gordon reasoned out the problem and called me long distance to offer the solution.

The program is coded to run on the "7-bit" pattern (1.0 chip). My computer has the 1.1 chip, so it was necessary to re-program the printer to accept only 7 bits.

His solution works! I guess this really proves that readers of *the Rainbow* are the smartest and most helpful to other CoCo users. (The graphic screen problem is still with me, but another reader may have that answer, so I am not concerned.)

Robert E. Foiles
Lancaster, PA

BOUQUETS AND BRICKBATS

Editor:

I now have 32K thanks to JARB software. This is a very good 16/32K upgrade kit. Why? First class parts. And the best instructions you will find anywhere.

C. Whitfield
Baltimore, MD

Editor:

I have a few remarks which may be of interest to other readers of your very informative magazine:

1) For those who have early model computers and disks: when I connected my drive I got not only the screen interference about which Radio Shack warns, but also a number of disk IO errors about which Radio Shack does not warn you. When I brought the computer in for the grounding (which RS will do for free) I not only got away from the interference, but the IO errors were cured too.

2) A further note on *TELEWRITER:* Yes,

it's as good as the reviews say. I've been using it for several months now and have had only two minor problems. Once the print-out put out garbage from somewhere instead of a line feed, although this corrected itself the second time I printed it. The second problem is that I have never been able to get the embedded font change to work—that's the command in the text which allows the use of different fonts without messing with the printer. I don't use this feature a great deal—but I might if it worked—so it isn't a big problem. The big problem, though, is that I wrote to Cognitec about these problems twice, one month ago and two months ago, and haven't gotten a reply to either letter. I recall the reviews I read saying how helpful the people at Cognitec were, and I just hope that they don't reserve their helpfulness for magazine reviewers. If you plan to use the embedded font commands, or if you don't like the feeling that once you've bought it you're on your own, you might keep this in mind, although I don't know of another editor with all these features.

Now, is anyone else having their disk drives write over parts of their saved programs?

Duff Kennedy
Santa Barbara, CA

Editor:

The reason for my letter is to relate an experience I had recently with one of your advertisers. On page 94 of the September issue is an ad for Snake Mountain Software. They advertise a software called *The Solution*. At a price of $12.95 I was a bit skeptical about it doing everything they say it will do. After several weeks of mulling it over, on Monday, the first of November, I sent my hard-earned money off to North Carolina. One week, to the day, later my *The Solution* arrived. I cannot put in words how much more enjoyable it is now to use my CoCo. The program is everything the ad says it is and is, in my opinion, the greatest bargain in software for the Color Computer that I have seen.

By the way, I'm using an NEC green screen monitor with the above software and now my little CoCo looks just like one of the "Big Boy" computers.

Harvey A. Dapeer
San Antonio, TX

Editor:

Spectral Associates has some excellent software, yet one of the most innovative and addictive games I've come across yet is their non-M.L., non-hi-res, 16K offering called "Eyewitness."

The game is a sort of observation test for up to four players, and is never the same twice in a row. I'll bet that after all the shoot-em-ups are retired to mildew away in their cassette racks, the owner of this game will still be *CLOADing* regularly. (Especially when friends drop in with a six-pack!)

For only about 12 bucks the game comes with a unique solitare game called "KLONDIKE."

Al Piscitelli
East Haven, CT

GHOST IN THE PRINTER?

Editor:

While recently playing a game of GHOST GOBBLER, with my printer (Epson MX-80 F/T) on, a line of garbage got printed as I ate a ghost. Testing later it happened again when I ate a ghost. But not at the same screen or score. I think it depends on how you eat the monsters, any ideas?

Also, there is a Color BBS in our area that just opened up. I have not had a chance to download anything, but there is a download section for Color Computers I know. The number is (716) 889-4473 from Rochester, NY.

Congratulations on a fine magazine! I plan to renew my subscriptions until I'm broke!

Doug Tooms
Rochester, NY

PROGRESS BACKWARDS

Editor:

Up until the day I received the November issue of *the Rainbow*, I had thought you were making tremendous progress. Then I plucked the November issue from my mailbox and discovered something had happened.

That issue had shrunken mightily from the previous issues, back to the size of the first ones. Even worse, when I opened the magazine I discovered someone had forgotten to count. The page numbers jumped from 4 to 135. Surely this could not be the fault of the careful postal workers, who ensure that each piece of mail, especially magazines, reach the subscriber in mint condition.

Virginia Lepley
Tallahassee, FL

Editor's Note: We *hope* this will not be a problem any more, now that we have gone to "perfect binding". But, please, let us repeat that we *do* send out every magazine every month and that if you have some problems with delivery, complain long, bitterly and loud to your local postal authorities. And, if your issue does not arrive by the 25th of the month, drop us a card. We'll replace it even though it is usually not our fault. The exception to this is if you have moved and did not notify us. Then, we're forced to charge you for the replacement copy.

CLUBS, CLUBS, CLUBS

Editor:

The Willamette Valley Color Computer Users meet every 4th Tuesday of the month in Room F-58 of Churchill High School. For more information contact Brian James, WVCCU, Churchill High School, 1850 Bailey Hill Road, Eugene, OR 97405.

Brian James
Eugene, OR

Editor:

I would very much appreciate it if you would inform your readers in Canada that there is a new Color Computer Users Group in Burlington, Ontario. We meet once a month at the Burlington Central Arena on Drury Lane, from 7 p.m. to 11 p.m. Anyone requiring more information may call or write me at (416) 639-3812, 1249 Northshore Blvd., Apt.1005, Burlington, Ontario, L7S 1C4.

Brent Bogle
Burlington, Ontario

Editor:

I would like to announce the formation of a CoCo club on the south shore of Montreal. For information write to 1686 Pl. Dauphin Chambly P.Q., Canada, J3L 4M7, or phone 658-3087.

Pierre Berthiaume
Chambly, Quebec

Editor:

Please announce the existence of the ALGOMA Color Computer Club. We now have 20 members and have only been in existence for three months. The club meets at the Sacred Heart School in Sault Ste. Marie, Ontario, on the First Thursday and the Third Tuesday every month at 7 p.m. I am the secretary and can be reached at P.O. Box 250, Echo Bay, Ontario, P0S 1C0.

Jim Payette
Echo Bay,

Editor:

I would like to announce the formation of the Jacksonville Color Computer Club. For more information call Bill Brown at 721-0282 or write to me at 2411 Hirsch Ave., Jacksonville, FL 32216.

William H. Brown III
Jacksonville, FL

Editor:

We are trying to form a CoCo Club in Columbia, S.C. People can contact me at 6016 Yorkshire Drive, Columbia, S.C. 29209.

Ed Sehlhorst
Columbia, SC

Editor:

Would you please publish that a Color Computer User's Group has been formed in Philadelphia in conjunction with PACS—Philadelphia Area Computer Society?

It meets the third Saturday of each month at LaSalle College at 20th Street and Olney Avenue. Anyone wishing information may contact me at 567-4276 or Apt. 1626 Kennedy House, 1901 J. F. Kennedy Blvd., Philadelphia 19103.

A. Arnold Weiss
Philadelphia, PA

PRICE INCREASE

Editor:

According to your November issue, *the Rainbow* is going to increase its subscription rates!

I can't say I blame you—can't imagine how you have packed so much into your issues so long! Though I am very much a beginner to the Computer Age, and at my age I feel like it is a foreign world, I am enjoying the challenge. And, your magazine has been a tremendous help. I immediately sent for all back issues. So, I do appreciate your growth and understand the price increase. As long as your content maintains the quality you started, no one should complain about the price!

Priscilla A. Hall
Hampton, NH

LIKES RAINBOW TAPE

Editor:

I've received the May, June and July *Rainbow On Tape*, and I'm very satisfied with the quality. John Waclo's NFL programs are an excellent piece of work. The *Universal Data File* program from June doesn't work properly—doesn't sort and loses the file sometimes after it is accessed. The *TESTEM* program from May has worked well and will be used much this school year.

I would like to see an article covering all the programming utilities, comparing their features, etc. I'm getting confused by all the competing advertisements for these programs.

Is there a possible scandal involving the quality of the 80C Disk Drive? Do you get much negative feedback about bad drives? I've seen some letters to you and others, and you had an item presumably from Radio Shack that indicated the early drives may have been lemons. I ask because I've got one and still have it. I hope to make an exchange with RS but it hasn't happened yet. Are the newer drives better? Is there a "Brand X" substitute available?

Some tips about the 80C Disk Drive I've picked up: Use an ink or typewriter eraser on the ROM contacts to clean off the tarnish which clears up the most common problems. When having trouble formatting a disk, liberally use a bulk eraser. You may have to use it more than once to get the DSKINI0 to work.

Your publication has constantly improved and I look forward to it each month. Keep up the good work.

H. Richard Pearce
Havertown, PA

Editor's Note: Your *UNIDATFL* problems should have been cleared up with the corrections we printed and Arnold Weiss' reprise on the program.

We know of no "scandal" involving the Radio Shack drives. Some of the earlier ones had some problems which were, to the best we have been able to tell, fixed by Radio Shack at no charge. By the way, your tips on cleaning the contacts are something everyone should heed. It is a good and inexpensive way to clear up most of the problems associated with disk drives. As to a "Brand X" drive, no one has seen fit to ask us to evaluate their product. There might be a reason for that.

Editor's Notes...

PRINT #-2,

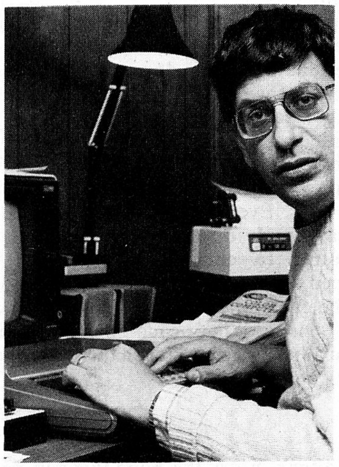
As you can see, some of the changes which we said we would be making to *the Rainbow* are coming to pass both a month ago and this month.

One of the more evident changes was a month ago when we went to a square-back magazine. It is called "perfect" binding and the reason that we did so was because we have just grown so rapidly that we were not able to staple the magazine any more. Besides, we hope that it will make it easier for you to find *the Rainbow* on your shelves now that you will be able to see the cover date on the spine.

Another change occurs this month, the advent of so-called "slick" pages. We know that some of you have written that you prefer the non-glossy pages that we had been using because light seemed to reflect on the kind that we are using in this issue. Also, several of you had commented that "slick" pages tend to rub off and get messy.

In going to these pages, we hope to dress *the Rainbow* up a little more than has been the case in the past. We are aware of the possible reflection problem, and hope that you will let us know your reaction to it, especially in contrast to the nice way that the magazine actually looks.

As to ink smears, we think we have eliminated that problem. Our printer runs each page through a varnish as it comes off the press and then fast-drys it. This, in effect, leaves a coating on the pages that should make them resistant to smears. There may be a little, but we are advised that it won't be significant, if it occurs at all. Sure, this costs us a little more, but we are most willing to do it to make sure you—our readers—do not have problems with ink smears.



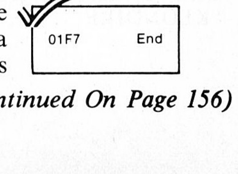
Another thing which (I hope) is evident is a new design inside. We had pretty much been going along doing design on an *ad hoc* basis, but now we have a real designer and artist on permanent staff. One of her first duties was to redesign (actually, design for the first time) the magazine. We hope that what we've done will make it easier for you to read and use. Let us know your thoughts and reactions.

And, I hope that by now (I'm sure you *don't* turn to this column first off) you have noticed what we feel is a *Rainbow* first: The first color centerfold ever to run in a computer magazine! We wanted to do something special for the Adventure Contest Issue—so we commissioned Fred Crawford to do the poster which appears in the center. You can tear it out easily and we hope it will decorate the wall of your CoCo room while you type in the listings for our two winning Adventures. By the way, Fred also did the cover this month and I am sure you will admit that he's a really talented artist. Expect to be seeing more of his work in *the Rainbow*.

I hope that you noticed, too, the little boxes with the *RAINBOW CHEK* on each program of any length that we have listed. This is going to be a permanent feature. Dennis Lewandowski, our Assembly Language columnist, wrote this utility to help you enter in programs without error.

We have gone to the trouble to copyright the program and trademark the name. That's really not important. What is important, however, is that we will willingly make available the *RAINBOW CHEK* program to any other publication that wishes to use it. Its sole purpose is to make it easier for you to key programs into CoCo without making typing errors. We are hopeful others will use it so that we can have a standard way to check programs.

You can use this in your CoCo Club and User Group newsletters, too. Permission to reprint the program is granted here. All you have to do is include the notice that the program is © *the Rainbow, 1983*. And, in using the program to publish the actual checks, merely use a trademark symbol with the words *RAINBOW CHEK* the *first* time you use it. A note should appear somewhere saying this is a trademark of *the Rainbow*. We do want to have this



(Continued On Page 156)

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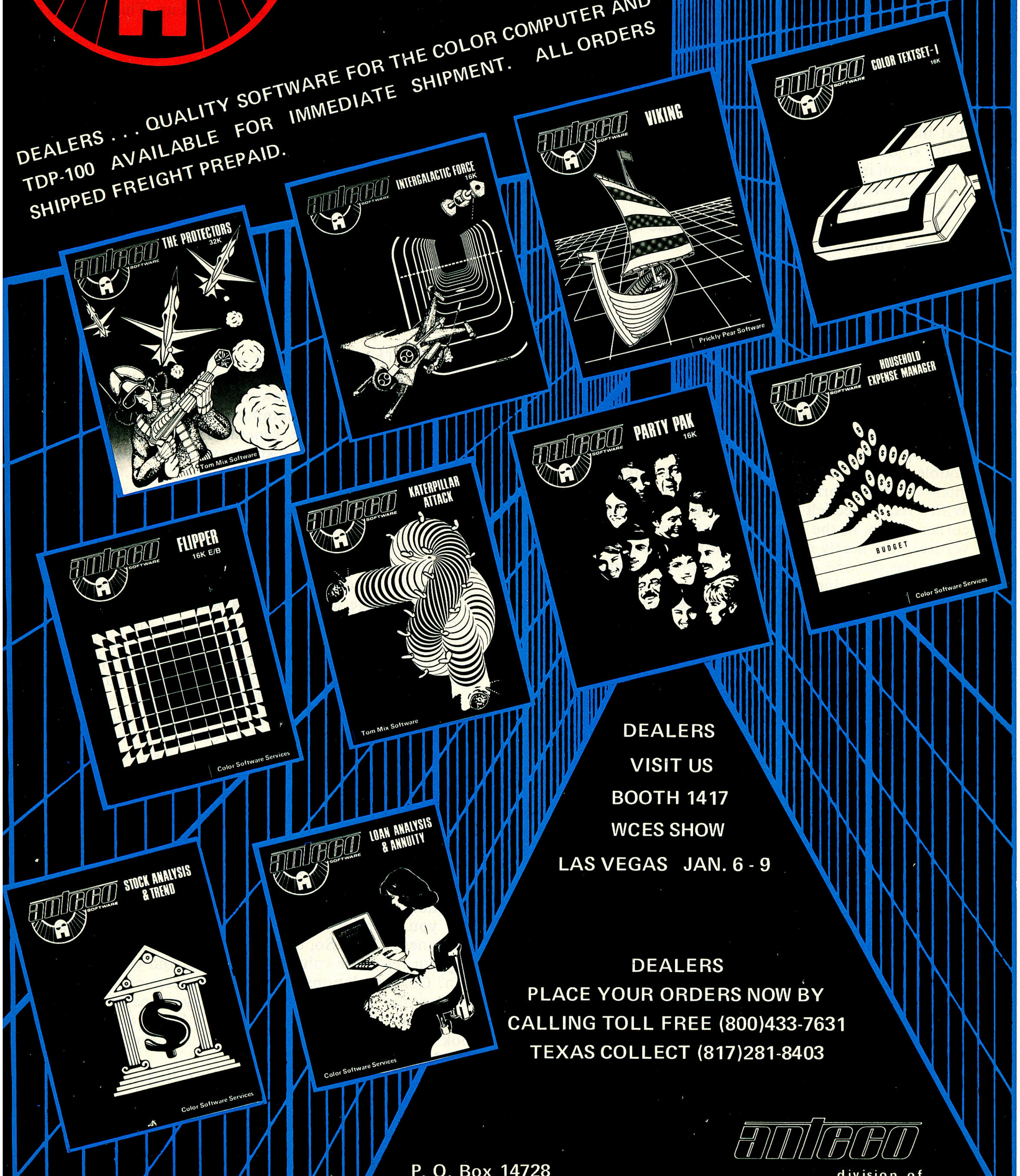

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Basic Training...

BASICally, It's Organization That Counts In A Program

by Joseph Kolar
Rainbow Contributing Editor

If you are up to date with us on all the suggestions we made last month, the time has now come for you to organize your reference notebooks.

First of all, why take notes? Why notebooks? You may find information of interest that you figure is important, but that you are not likely to remember. Write it down! You may find information that is not needed at present but you have that instinctive feeling that you will need it in the future. Write it down! You'll find that if you paraphrase some information into your own familiar vocabulary or style, you will be more likely to make sense out of it, and thus, remember it. Write it down!

When you get in the habit of putting the vital information on paper, you are being creative. You are creating your very own personal reference file.

At this point, you might just as well organize your efforts, and there is an inexpensive way to create your personal reference file. Purchase four one-subject, spiral bound, ruled notebooks. Get one each with a yellow, red, blue, and green cover.

To set up your notebooks, get a black, felt-tipped pen, and number each sheet(not each page) in the lower right-hand corner. The inside cover should be blank. About an inch in from the left edge of the inside cover, rule a double vertical line, top to bottom. About an inch from the top, rule a double horizontal line. Then at about three-eighths inch intervals, draw horizontal lines to the bottom of the cover. With a red-tipped felt pen, print 'page' in the upper left-hand corner. Then, in the large area to the right of your double vertical line, neatly center and print the word "contents."

On the outside cover, stick a piece of gummed tape suitable for labeling (neatly trimmed and centered), an inch from the top. Put a second piece of tape over the subject/name area, or about one to two inches from the bottom of the cover.

Need I say "Do the same to the other notebooks?"

When you determine what the contents of a notebook will be, (hints), (subroutines), (color hints), (graphics), whatever, depending on your own requirements, mark the two labels you stuck on the cover. Use a black felt-tipped pen for best results.

The color of the notebook cover will be a color-coded hint, giving you a clue as to its contents.

Let us run through an example that will show how you can format your notes. Remember, this is just an idea. You should do it in any way that is easy for you and which is meaningful to you.

Use two pens. One that writes in either black or blue and one that writes in red. In black ink, print a title that has meaning to you, centered, on the top line of the page you numbered with a one.

Skip a line and, starting at the red vertical line, print an opening statement, if any. Then skip a line and print the title of the book, for instance, "example". Skip a line and, using the red pen, print in the lines of your program or subroutine. To the left of the red vertical line, print the line number, and then print the contents of the line to the right of the vertical red line. When you are finished, look over your handiwork, making sure it is accurately copied. Underline in black anything you believe needs special emphasis.

Skip a line and use the black pen to explain what you did, and what its significance is to you. Use words that are meaningful to you.

Here is a sample of what I mean. I thought it would be good to keep it for a reference, since I was not likely to memorize it. I copied it from some publication long forgotten.

RANDOMIZE

On start-up, the computer will give the same sequence of random numbers each time it is started up. This may not be desirable in some instances.

EXAMPLE:

```
10 REM (RANDOMIZE) TEST PROGRAM
20 PRINT "RANDOMIZE"
30 FOR X = 1 TO 8
40 PRINT RND(0)
50 NEXT X
100 END
```

Change line 20 and add lines 22 to 28

```
20 PRINT "ENTER WHOLE NUMBER (SEED) FOR RND";
22 INPUT S
24 FOR I = 1 TO S
26 X=RND(0)
28 NEXT I
```

NOTE: This should cause a new generation of random numbers for the (RND) function each time the program is run. Run the program a few times using different numbers. Since, every time the computer is started up, the same sequence of numbers is generated; the top of the list of random numbers is "thrown away" and the list starts with the (S+1) entry.

If you need more space for your notes, continue on the reverse of Page 1. You may want to print a reference at the bottom line to show from which source you copied the notes, especially if you extracted it from a longer article. For example: (*Rainbow*, Pg. 70, Feb. 82).

When the whole thing is completed to your satisfaction, go to the inside cover. With a black pen enter the page number, and under the 'contents' enter the title or some other words that are meaningful to you. By the way, there are other ways to generate different starting numbers, but I wanted this down on paper for my own interest and benefit.

To review briefly, you will find lots of things of interest that will catch your eye when reading magazines such as *the Rainbow*, or Radio Shack's *TRS-80 Microcomputer News*. You will also notice interesting items when you are keying (or typing) in programs, or some interesting subroutines that you may want to have available for future reference. If you want to keep a record of them, you now know what to do. Write it up in the appropriate color-coded notebook, preferably using your own words.

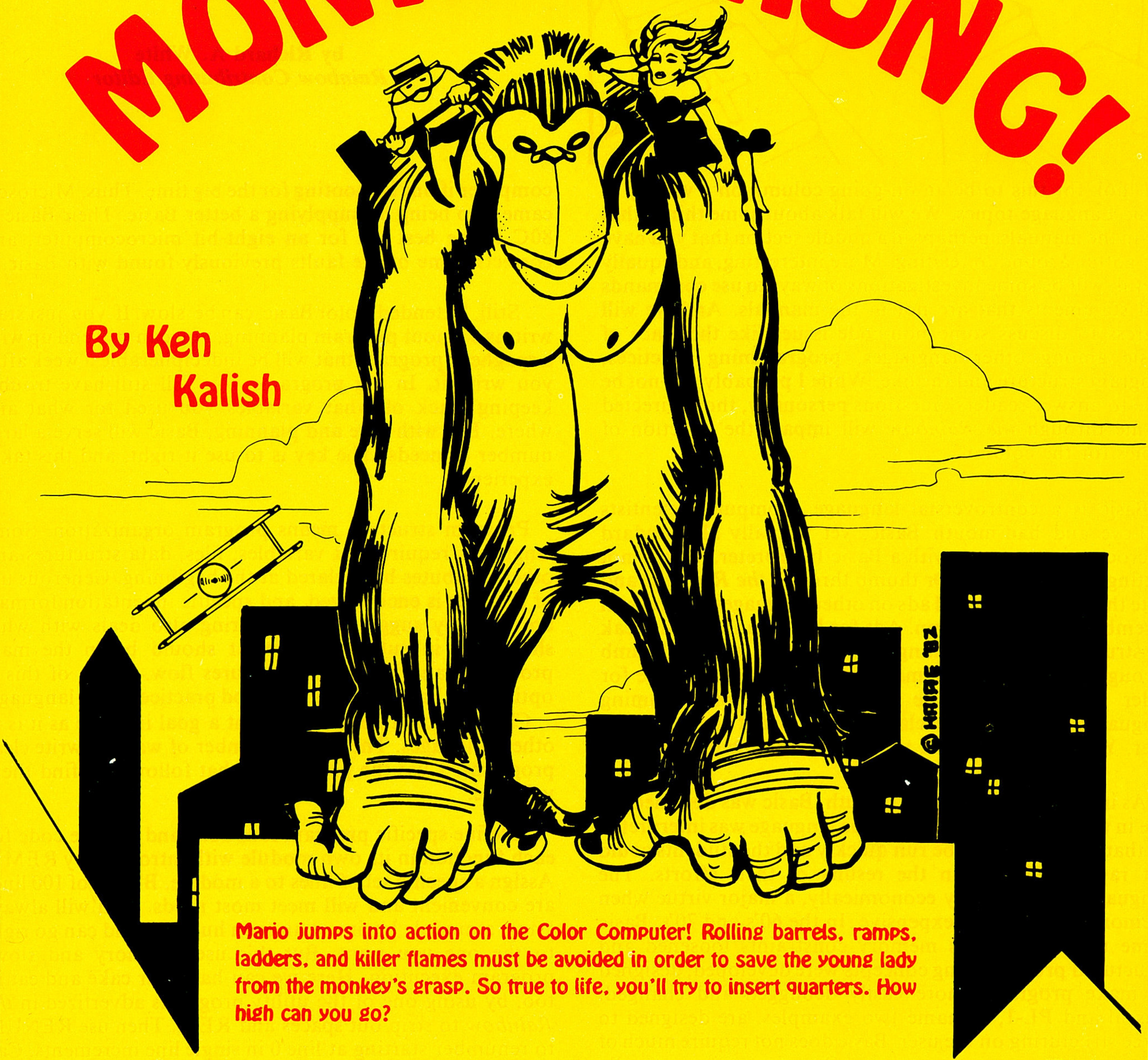
There is one other reference tool you will want, but it properly belongs to the subject of the next article. Purchase one more notebook, but don't set it up.

If you have any notes, now is the time to give them a permanent home. So, take some time out from computing, get your reference volumes organized, and you'll have fun! Fun? Congratulations! You have just begun the process of writing your personal reference library in a painless manner. You didn't know you could write a book, did you? Well, look what computing has done. It made you an author! That's pretty good.

Next month we'll talk about organizing your tapes, and since organization is the key to creative freedom, please stay with us. It will all help you to have fun doing your thing on the keyboard.

MONKEY KONG!

By Ken Kalish



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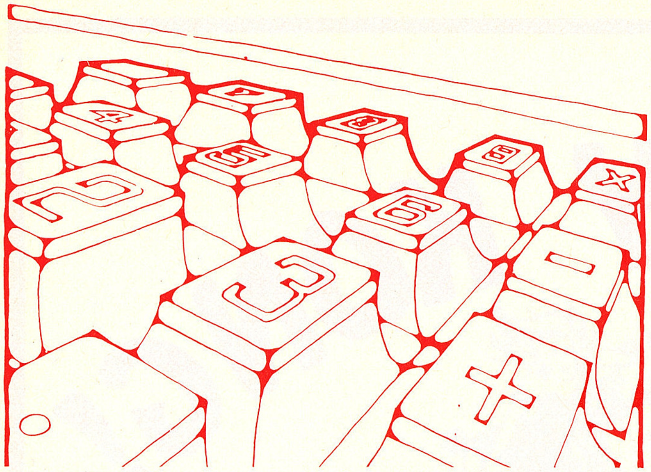

The Use of Basic: Some Weaknesses, Some Solutions

by Richard A. White
Rainbow Contributing Editor

I look for this to be an on-going column on a variety of Basic Language topics. We will talk about some things that are in the manuals, perhaps in a middle section that you have not gotten around to reading. More interesting, and equally useful, will be some investigations of ways to use commands and statements that are not in the manuals. And we will digress to discuss some non-code issues like the place of Basic among other languages, programming practices, program structure and the like. While I probably will not be able to answer readers' questions personally, those directed to me through *the Rainbow* will impact the selection of topics for the column.

Basic is a controversial language. Computer scientists evil-eye and bad-mouth Basic, yet virtually all standard microcomputers come with a Basic Interpreter. Who is not getting what message? Or thumb through *the Rainbow* and note the information and ads on other languages. There is an assembly language column. Ads for Pascal and Forth speak of structured programming and program speed. Thumb through other computer magazines, particularly those for older systems, and note the variety of programming languages available, each claiming significant benefits to the user. Yet it is no accident your 80C comes with Basic.

As initially devised at Dartmouth, Basic was designed for use in teaching programming. The language was interpreted so that the code could be run quickly and the students could get rapid feedback on the results of their efforts. The language used memory economically, a major virtue when memory is scarce and expensive. In the 60's and 70's, Basic came under attack as memory constraints loosened and structured programming concepts were developed, designed to make programs more easily debugged and changed. Pascal and PL-1, to name two examples, are designed to force structuring on the user. Basic does not require much of the user except correct syntax. One can write a totally confusing Basic program that will work.

The advent of the microcomputer forced a choice of language. About the time the fathers of the Apple were designing hardware in a garage in California, pirated copies of a new Basic Interpreter were circulating in the same area. Only six years ago, memory for a microcomputer was costly. In addition, a microcomputer is highly interactive with its user. Basic was the perfect choice for the language for the new machines. The pirated Basic Interpreter was good enough that its author was found and contracts entered. Obviously, one does not put stolen software in a commercial computer if one is shooting for the big time. Thus, Microsoft came into being by supplying a better Basic. Their Basic in 80C is the best yet for an eight-bit microcomputer, and corrects some of the faults previously found with Basic.

Still, Extended Color Basic can be slow. If you just start writing without program planning, you can still end up with a spaghetti program that will be indecipherable a week after you write it. In big programs you will still have trouble keeping track of what variables you used for what and where. But with care and planning, Basic will serve a large number of needs. The key is to use it right, and this takes experience.

Program structure means program organization. Some languages require that variables, files, data structures and other attributes be declared at the beginning. Generous use of remarks is encouraged, and specific indentation formats are strongly suggested. Structuring also deals with what should be in subroutines, what should be in the main procedure and how the procedures flow. Much of this is optional in Basic; some is just good practice in any language.

Clarity should be as important a goal in Basic as it is in other languages. There are a number of ways to write clear programs. I use the procedures that follow and find them valuable.

1. Define specific program functions and put the code for each function in its own module with introductory REM's. Assign a specific set of lines to a module. Blocks of 100 lines are convenient and will meet most needs. You will always know a module begins at an even hundred and can go right to the one you want. But this uses memory and slows program execution. Here we can have our cake and eat it, too, by using one of the utility programs advertized in *the Rainbow* to strip out spaces and REM. Then use RENUM to renumber starting at line 0 in single line increments. Call your original the "Source," to be used when making changes while the compressed program is the version to run.

2. Minimize looping back. The procedure should flow from start to end and loop only to repeat the routine or a portion of it.

3. Use *IF...THEN...ELSE* to minimize jumping forward. Many times all the code for the choices can be contained after *THEN* and *ELSE* on one line, so that the procedure can continue on the next line. Some forms of Basic don't have *ELSE*. Apple doesn't and Apple owners pay extra for the lack. To illustrate, which is clearer to you?

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```
10 If X=0 THEN PRINT "FALSE": X=1 ELSE PRINT
"TRUE"
20 END
```

or

```
10 IF X=0 THEN 30
20 PRINT "TRUE": X=1: GOTO40
30 PRINT "FALSE"
40 END
```

4. Put all subroutines in one of two places. Frequently called subroutines, including those that affect program speed, should be at the front of the program. I reserve lines 5 to 99 for these. These should not be more than three or four lines. Line number spacing of *two* is good. Putting subroutines here serves two functions. First, the computer finds them quickly when speed counts. Second, you save bytes, since the number in the *GOSUB* is only one or two bytes long. Infrequently called routines, particularly program initialization code, should be at the end of the program. Each time a subroutine is called, or the computer is sent to a specific line, it starts at the beginning of the program and searches until it finds that line. The fewer lnes it passes to find the needed line, the faster the search will be. It follows that speed is compromized if the computer is continually searching over code it has used and will not use again. Clarity comes from having only two places to look for subroutine at the end of the module that calls it when only that module uses it.

5. The same reasoning used above also applies to the ordering of main program modules, provided they are called separately. Those used most frequently are put in front of the occasionally-used ones. In a file program, the input module is used far more than the save-to-tape or disk module, and should come to the front. Modules that are used in order should be placed in order in the program.

6. Menus should be placed where they are used in the program. A menu's text provides valuable information on the branching of the program that follows. If menu choices are numbered from one, up in sequence, the *ON I GOTO XXX,YYY,ZZZ* or *ON I GOSUB XXX,YYY,ZZZ* commands can be used. It is easy to read a listing, see which number corresponds to the code block you want, and then drop down to the *ON I* statement and count across to find the target line number. Memory conservation sometimes forces use of strings defined elsewhere in the program in menu text. When this is done, the advantage of reading the menu code to know what options are there, and where to go for their code, is lost. Programming is a series of compromises. It is up to you to know what your options are, and to make sure that your choices are educated ones and not guesses or blind repetition of past practices.

Though I introduced program structuring for purposes of easy trouble shooting and modification, the proposed structure facilitates program speed, as well. Memory use was another consideration. Clarity, memory, and speed are like three corners of a triangle. You cannot be at all three points at once. You can, however, make choices that shorten the sides of the triangle and get you close to where you want to be. It takes careful thought and planning at the start, so you don't end up redoing too much. Don't be upset when you don't get what you want the first or second time. Remember, all good commercial programs have version numbers, and Version 1.0 is the first one offered for sale, not the first one of the development process.

The Dragon's Byte

Create A Character File Program

By Bill Nolan
Rainbow Contributing Editor

(Mr. Nolan, an experienced Dungeonmaster in a popular fantasy role playing game on a weekly basis, is the president of Prickly-Pear Software.)

Well, the holidays are over, and some of us survived the ordeal! I'm glad to see you are all back here with me again in 1983, and I want to take this opportunity to congratulate *the Rainbow* on a super December issue. Very impressive, Mr. Falk!

This month we will talk about how to create a program which will help you store and update all of the information needed to keep track of a fantasy character. We will start at the very beginning on this one so you can watch the program take shape. Whenever you decide to write a new program, the first thing you need to do is determine exactly what you want the program to accomplish for you. This step is often skipped, and is the reason so many programs seem to have been written in a vacuum.

Remember, the most important thing when writing a program is knowledge of the problem you want solved. Knowledge of the computer and programming technique are far less important! In other words, don't let yourself be intimidated by the computer. Just look at how much bigger you are !

Also, don't let yourself be intimidated by those who would have you believe there is only one way to write a basic program. Usually these people will refer to a nebulous concept called "structure," and imply (or state openly) that if a program lacks "structure" it is somehow sinful.

Programming can be approached (and taught) as either a science or an art, and those who teach it as an art encourage their students to develop their own style, and thus their own distinctive "structure." A uniformity of style or structure is only important in two settings. If you are a student in a programming class, the instructor needs all work handed in to be similar in structure. Otherwise grading would be a nightmare. Those of you who work closely with other programmers will also need to write with a similar style, because the parts will not blend together easily unless you do.

The great majority of you are not in either of these situations, though, and are not so heavily constricted as to style. Basic is a language, and there are many authors who use it effectively, just as many authors use English effectively, although their individual styles may differ wildly. So, avoid using *GOTO* (as the advocates of "structure" recommend) if it causes *you* problems, but if it doesn't, don't worry about it.

Now, what do we want accomplished by our character record program? First, we have to store the character's name, ability scores, and other basic stats. It would be a good idea to be able to keep a complete list of possessions and money, and we will certainly need to keep track of magic items and the charges they have remaining.

We will want to be able to keep track of level, hit points and injuries, and if the character has special abilities such as magic spell use or thieving abilities, we will want to keep track of these, also. If we are to make this complete, we will need to know about proficiency with various weapons and

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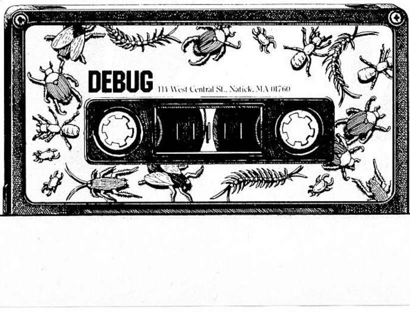
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saving throws, and I'm sure more things will come to mind as we go along.

Once we have all this information in the computer, we will need to be able to manipulate it in various ways. We will want to be able to save it to tape or disk, or output it to a printer, and we will want to be able to examine and change any item as desired. Since we will want to be able to jump easily to any part of the program quickly, we will want to have some kind of a "menu" of program functions available.

Once we have decided what we want the program to accomplish, we can decide how we want to organize it. When writing a fairly complex program like this one, I find it helpful to divide it up into a bunch of little programs, and then write each one separately. In this case, for example, we could write a program starting at line number 10 that will print the menu on the screen and then get our input from the keyboard before branching (*GOTO* or *GOSUB*) to one of the other sub-programs.

Then, we could write another little program at line number 1000 to allow us to start a new character record from scratch; one at line number 2000 to load an existing character from tape or disk; another at line number 3000 to save a character out on tape or disk; another at 4000 to update the basic stats; another at 5000 to keep track of possessions, and so on until our big program does everything we want it to do (or we run out of memory). In this way, we may end up with a long and complex program, but we will only have to write several short and easy programs.

Some things will have to be kept track of while we do all this. Start two lists, and keep them up without fail. The first is a list of variables used in the program, and the second is a list of line numbers where the various sub-programs start. These will be necessary as we go along. If you don't already have the habit, I also recommend strongly that you start now to save a copy of your developing program to tape or disk every half hour or so to avoid losing a lot of time in case of a power outage or other tragedy. Better yet, save it at least twice, on different tapes or disks, and store them in different houses (in case of fire).

Next month we will start the actual writing of the program, so if you think I'm leaving anything major out of the character record program, let me know *quickly*. I'm sure that some things will come to me as soon as I mail this column off, but I can use all the help I can get. By the way, have you ever noticed how some writers always use *we* when referring to themselves alone? I have always been fascinated by this, as I assume these people either have royal blood (or a mouse in their pocket).

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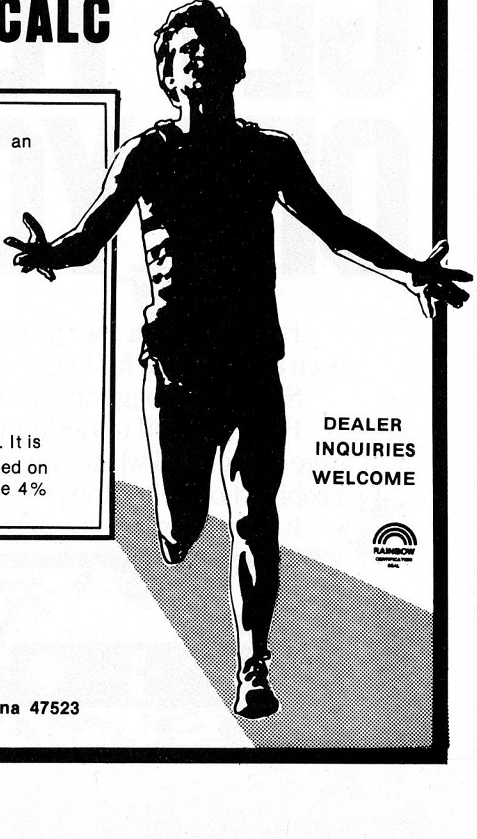

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Go Adventuring With GAPAD

by Geoff Wells

Editor's note: Last month, in Geoff Wells first installment of the GAPAD series, he mentioned some program changes which would allow you to run the program and check for any typing errors. If you were unable to find the list, we must admit it's because we slipped up and forgot to include it along with the regular program listing. Geoff called us recently from The Data Man, the company he owns in Hamilton, Ontario, to kindly bring this to our attention. You will find those listing changes with this month's Corrections on page 188 .

Last month, in the first of this three-part series, we printed the general all purpose adventure driver. If you followed the suggestions in that article you will now be ready to add your own data statements to the program and create your own original adventure. We will start with a brief description of how the program operates and what each module does.

After identification and dimensioning, the data statements are read into the appropriate arrays, and the players' starting location is set at line 90. The code string in MC$(X,Y) is pulled apart in line 100 and used to build the location description and possible directions allowed. Lines 110-150 construct the location description (L$) from the words and phrases stored in data lines 1000-1999. The visible object string (OB$) is built at line 160, and the results are printed by the subroutine at 500 (which will print a string of any length without splitting words at the end of a line). Line 200 waits for input; sequence 210-211 checks for valid one-word commands and directs program flow if one is found, 220-320 checks the first and second words to see if they are recognized, and line 330 sends the program to the area dealing with the first word. Sequence 600-607 takes care of direction commands, 610-614 prints the inventory and line 650 gives any 'help' you decide the player should get. 700 and 800 save or load a game in progress. 1000-3600 is where you decide what happens for various valid command combinations. Remember, only valid combinations will reach this point. Commands like 'GET RIVER' or 'EAT DOOR' have already been eliminated.

Now we get to the data statements. This will probably sound more difficult than it really is, but if you can't follow the logic maybe you will be able to sort it all out by referring to the completed program in next month's *Rainbow*.

The location descriptions are built from words and phrases in data lines 10000-19999. The program is presently set to add four phrases together but you can change that as necessary. Count the total number of elements in each of the four groups and put these values in the *FOR NEXT* loops of lines 120-150. Data lines 20000-29999 contain the first three letters of the first command words that you wish to recognize. The single letter in each data pair is used in line 330 as the *ON GOSUB* number. It is also used in line 310 to check for compatibility with the second word in the command. Note that words of similar meaning such as *GET* and *TAKE*, or *DROP* and *PUT* have the same letter. If you make any changes to the list supplied you will have to change the *DIM FW$(40), FC$(40)* in line 10 and the *FOR NEXT* loops in lines 40 and 260.

Lines 30000-39999 hold the data pairs for the first three letters of the second command word and the code letters for the first words with which they are compatible. For example a lamp can be *GOT*, *DROPPED*, and *EXAMINED* but not *KILLED*, so the code letters for lamp would contain A B and C but not G. The number of data pairs you are using in this group goes into the *DIM SW$(##), SC$(##)* of line 10 and the *FOR NEXT* loops in lines 50 and 280. The codes in lines 40000-49999 are for the two dimensional array MC$(X,Y). The two dimensions are for the map coordinates X,Y and are read in columns, with X stepping once for every column of Y. The first six bits in the code are NSEWUD for the directions the player is allowed to move from that particular location. If a direction is not permitted, then replace the letter with an asterisk. This code can be altered during play using *MID$* if, for example, a door is opened or a passageway cleared. The remainder of the code is used to build L$ (location description) from the four data sets beginning at line 1000. The two bits of each of the four numbers points to the position in the data group of the phrase you wish to use.

The last data group, staring at line 50000 is for the objects you will find along your way. There are four elements to each group; the X,Y coordinates of the object, read by OL($$,0) and OL($$,1). The complete description OD$($$) and the object keyword OK$($$). $$ is the total number of objects in your game and goes in lines 10, 70, 160, 611, and 1100.

The number of things a player can carry at one time goes into the *DIM IN$(%%)* line 10 and the NF loop lines 611, 1000,1010, and 1100. All you need now is some code to check for a winning situation and your adventure is complete.

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And Now... The Envelope, Please!

By Jim Reed

Rainbow Managing Editor

Editor's Note: Jim Reed's long-suffering better half, Dorris, shares her husband's interest in computers, but is a bit worried about the effect of his spending so much time with these Adventure programs.

"He's working them mostly at night -- and late at night," she reported recently. "He hardly sees the light of day.

"The TDP couldn't be turning him into a *vampire*, could it?"

From New York to California, Wisconsin to Florida...from Sawmill Road to the 12000 block of West Balboa Drive, from mid-America and central Canada, too...from 4K to 32K...graphics and non-graphic...the entries in the first annual *Rainbow* Adventure Contest came in.

What a variety! A plane crashes in the jungle...a love boat island hops...a carpet flies...a horse runs away...a Trans Am car needs a driver...a space station seems to run itself. Throw in a heaping helping of creaky old mansions, eerie castles, underground tunnels and traps, traps, traps.

You think judging an adventure contest is easy, do you? Well, we've been thrown in pits, bitten by snakes, blown to bits by a self-made bomb, flash-fried by dragon breath, caught in cobwebs, surrounded by fire, poisoned by arrows, needles and spiders, drowned in blood, nibbled on by piranha and crocodiles, hacked by an axe, strangled, shot, beheaded, eaten alive and brutally slain by every monster imaginable: dragons, zombies, lizards, hydras, giants, robots, demons, harpies, trolls, wererats, burglars, wizards and even ants. Invariably, a replay of an adventurer is simply death warmed over.

The funny thing about all this is that you can hardly wait to get your turn at bat, can you? Well, your time is coming -- in this issue of *the Rainbow*. For your personal pleasure and family entertainment, we have selected from the dealers of death the very best architects of annihilation. The envelope, please!

The winners are...You! The readers of *the Rainbow*, for we are printing the entire listings on the two top winners' programs, the grand prize winner for a graphics adventure and the top eliminator, so to speak, for the non-graphics division. Heed these words, though: the goblins will surely get you, even if you do watch out. So, get your personal affairs in order before embarking on this journey to death's door, and beyond.

Well, there are some lighter moments, even when the shadow of death darkens your path. Let's see, we seem to recall being stung on the nose by a bee, stumping our toe on kicking a door, having a carved pumpkin fall on our head, being devoured by a man-eating soup can and having an evil scientist's experiment turn us into a microwave oven. Your kind of fun, you say? Well, read on and we'll give you the lowdown on these high adventures.

Naturally, the love of money is the root of all this evil. And, if it's treasure you're after, we have bullion by the billion, pearls by the basketful, valuable relics, an emerald statue and free hula lessons. There are also fiery diamonds that'll singe your fingers, rubies for rubbing, a gold knife that's hot merchandise, a sack of marbles and enough red herring to divert a hungry bear. But, while we believe wealth is its own reward, you'll pay dearly as you search for the pots of gold in *Rainbow's* contest.

Well, enough hyperbole. Let's talk results. Let's announce the winners. Let's distribute the prizes. Let's experience these adventure for ourselves.

We've painstakingly whittled down the numbers to settle on a baker's dozen. Here, *in alphabetical order*, are the Lucky Thirteen -- all of whom will receive prizes, and from whom we have singled out the winners, runners-up and a number of special honorable mentions:

GREGORY CLARK of Syracuse, New York, for *Sir Randolf of the Moors*

DON DUNLAP of Reynoldsburg, Ohio, for *The Polynesian Adventure*

CHRIS HARLAND of Regina, Saskatchewan, Canada, for *The Deed of the York*

ROBERT W. MANGUM, II of Titusville, Florida, for *Horror House*

JORGE MIR of New Berlin, Wisconsin, for *Dreamer*

JORGE MIR of New Berlin, Wisconsin, for *Oneroom*

JUSTIN PAOLA of Berkeley, California, for *Search for the Ruby Chalice*

GREGORY RICKETTS of Columbus, Ohio, for *Dungeon Adventure*

JEAN ROSEBOROUGH of New Berlin, Wisconsin, for *Door*

STEVE SHERRARD of Normal, Illinois, for *Dungeon Adventure*

SCOTT SLOMIANY of Downer's Grove, Illinois, for *Dr. Avaloe*

RICK TOWNSEND of Bettendorf, Iowa, for *Escape from Sparta*

CHRIS WILKINSON of Larchmont, New York, for *Lighthouse Adventure*

If you're the superstitious type, take note that Jorge Mir's name appears twice—he had two entries. So, really, only 12 people are in the finals. Also, note that two entrants had adventures by the same name, Dungeon Adventure (one is graphics, one non-graphics), so we only have a total of 12 titles in the Lucky Thirteen.

The Lucky Thirteen. Actually, luck had little to do with it. These folks all worked long and hard to create their winning entries. For their efforts, not only will they receive valuable prizes from generous *Rainbow* advertisers, but each of their adventures will be published in the near future. As we said, the top winners' games are published in *this* issue.

In keeping with the great Miss America contest tradition, we'll save the royal coronation for the grand finale. First, some special awards and honorable mentions, then the runners-up, then the two top winners whose programs are listed herein as well as in this month's edition of *Rainbow on Tape*.

THE SOUNDS OF MUSIC AWARD to Don Dunlap for *The Polynesian Adventure*. Not only musical interludes, but music from the islands. Don's entry made excellent use of the 80C's sound capability and also put others to shame with his artful use of colors. *The Polynesian Adventure* was not only easy to play, but it did not end the game when you screwed up; a slap on the wrist was a much-appreciated punishment by our judges who had grown weary indeed of having to start many games from the top every time they made a fatal mistake. We commend Don for the leniency and recommend that more adventure writers consider wounds and bruises or other penalties in lieu of crudely and rudely ending the program for every little infraction.

THE DOOR PRIZE (what else?) to Jean Roseborough for *Door*. Ms. Roseborough believes there are 44 ways to open doors. Billed as the world's shortest adventure game, we recommend this 4K game for children; supply them noun and verb lists and let them learn how to spell while they're banging their heads and everything else to get the door open. (Confidential to JR: How about "Fire!," "Pizza," "Police," "Avon Calling," "Meter Man," or "Honey, I'm home."

BEST SCIENCE FICTION TROPHY to Rick Townsend for *Escape from Sparta*. In this action-packed mission, your object is to save your creator. No desecration or sacrilege intended, it's just that you are an advanced robot yourself and you and all those like you need your creator to keep your springs wound and your joints oiled and whatever. Trouble is, the evil warlord has captured your creator. This is a computer game in which you use the space station's computers to get help and to locate the creator. And action! We were being shot at by an enemy robot as soon as we were beamed aboard. (Confidential to Rick: Space Dust, huh! A nice way to treat somebody who thought your title page was classy. By the way, your printout of the listing on Radio Shack's graphics printer was highly readable; not that we had to peek for help, or anything like that.)

SPOON FEED THEM AWARD to Chris Harland for *The Deed of the York*. Some adventure games seem impossible to win, but not this one. You may use up several incarnations, but persistence will pay off if you just keep reentering this haunted house to find the hidden deed. If you collect even a portion of the clues and still can't find the deed, you'd better stick to Pong. A fun game to play, and Harland obviously has a warped mind. One minute you pinch your finger, the next you're a goner. (Confidential to Chris: A pizza delivery to a haunted house? You must know *Rainbow's* creator, Lonnie "plain cheese, lightly cooked" Falk. Too bad for you he abstained from the judging; you'd have won even bigger.)

BEST TITLE PAGE CITATION to Robert W. Mangum II for *Horror House*. A lot of work goes into title pages. Many are quite artistic. Some move. Some have brilliant colors. Some flash. Mangum has it all. Really, you have to see it to appreciate it. Have patience; it'll be published before long. The judges liked the fact that you can fight the monsters in *Horror House* for a bit and then split if they seem to be getting the better of you. You get a blow-by-blow report of your own and the monster's condition. (Confidential to RWM II: About that vending machine that says "Drink Creature Cola," we lost a lot of coins in that contraption. You know, realism has its drawbacks; that machine is too much like the real thing.)

THE ONE ARM TIED BEHIND YOUR BACK MEDAL to Jorge Mir for *Oneroom* and *Dreamer*, a combination entry created under self-imposed limitations. Many of you owe much of what you know about writing adventure games to the articles Jorge has authored for *the Rainbow*, and frankly, he took us a bit by surprise in entering the contest. But, then, we did make a wide open

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invitation -- it wasn't even void in Nebraska. Well, Jorge, the mark of a good teacher is to be surpassed by your pupils. In effect, though, Jorge took himself out of the running by electing to submit the extremes in programming: a 32K adventure that never gets out of the original room, and a 4K adventure that has 26 rooms. That's right, in *Dreamer* you can visit up to 26 rooms, get in a sword fight, ride a horse, get chased by a bear, take a boat ride, explore a cave, and kill yourself a half-dozen different ways -- all in a 24-line, 4K program. On the other hand, in *Oneroom*, everything you need is within easy reach, but don't expect any easy way out. While *Dreamer* is mainly for beginners, *Oneroom* promises to keep the veteran adventurers well contained. (Confidential to Jorge: You developed your 32K program with "ADVMAKER," didn't you?)

JORGE'S BEST PUPIL PRIZE to Steve Sherrard for *Dungeon Adventure*. Go to the head of the class, Steve, and listen to your high school teachers. It's obvious you've been sitting on the back row writing computer programs during your English literature and trigonometry classes. Musty rooms? Moldy bones? Drunken guards? Oh, to be 16 years old, like Steve, again. *Dungeon Adventure* is a cleanly executing game based on a format printed in the July, 1982, *Rainbow*. Not a thing wrong with that; no sense re-inventing the wheel when you have a tried and proven format. Special praise to Steve for that spacey musical ditty at the end of the game. It was very satisfying. Too often, we find that after successfully completing an adventure, defying death, conquering evil and decimating demons, we get no more than "Congratulations!" printed, and then a clear screen. For a change, we get a treat for a job well done.

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RUNNER-UP (Graphics Division) to Scott Slomiany for *Dr. Avaloe*. This is a very interesting entry. It's a two-part program, done in a two-part format, calling for two-word entires. In *Dr. Avaloe*, you begin inside a complex of rooms, and the idea is to get outside, alive. Basically, *Dr. Avaloe* draws you a picture of the room you're in and shows your location in the room. Then, you hit *ENTER* to go to the text screen and you enter a two-word command. Then, it's back to the graphics screen to see what you accomplished, and so forth. Adding a nice touch are the songs that are played as you leave every room -- and leaving a room is no mean feat, by the way. *Dr. Avaloe* is in ASCII format and takes patience to load, but it is a challenge. Words soon to become a catch phrase among the judges were: "You died a sorrowing death; I hope you had fun, though. Rule #8 was a favorite, too. It reads: "Don't do stupid things." We found this to mean "Don't do anything the least bit logical," in actual play. If you want to leave a room, heading for the door is only a last resort. If you find a key, don't expect to unlock anything. You get the idea. Why did we climb into the coffin when invited? Well, in the convoluted scheme of reverse psychology we soon learned to live by, it seemed like a bad idea at the time -- so, of course, we did it.

RUNNERS-UP (Non-graphic Division) A tie! A stand-off between the East Coast and the West Coast. After being sequestered, browbeaten, and threatened with bodily harm, the judges emerged to announce that Justin Paola's *Search for the Ruby Chalice* and Chris Wilkinson's *Lighthouse Adventure* were deadlocked for second place and that was that. The *Rainbow* editors could decide how to divvy up the loot. *Search for the Ruby Chalice* is really fun to play. You and your pilot have landed your pontoon plane on a lake in the jungle and your objective is to find the ruby chalice and escape in one piece. Head hunters! Wild animals! And that (expletive deleted) snake that bites you every time you go through a key intersection. You can pick up and drop a variety of items, but you'd better keep that snake bite kit handy. This is an adventure we really "got into." It also brought more appreciative laughs than any other game for the surprises it offered, such as the memorable "Scream from the East."

Then, there's *Lighthouse Adventure*, with a pirate's log book, a musket, lots of hidden panels/doors/clues and a huge sea serpent. This co-runner-up adventure is baffling at times, but you keep being drawn back to it. It's addictive. The first objective is to search the lighthouse and its environs to find the gold. But that's only the half of it; then, you have to make your getaway, and that's a heavy problem when you have tons of bullion. (A semaphore message to Chris Wilkinson: The British may jolly well call it a "trolley, but in America we call it a "dolly.")

And now...TA DA...the winners! CONGRATULATIONS GREGORY!! And, you can say that again, CONGRATULATIONS, GREGORY!!, for both top winners are named Gregory. In our eternal search for relevance, we note that this announcement comes as the Gregorian calendar begins a new year. But enough of this Gregorian chant, let's meet the winners.

In our graphics division, Gregory Ricketts is the grand prize winner for his *Dungeon Adventure*, which features a Dungeons and Dragons influence, but is otherwise quite unlike anything else the judges have seen. We found it easy to understand, exciting to play, and a novelty among adventure games. The judges were unanimous in selecting

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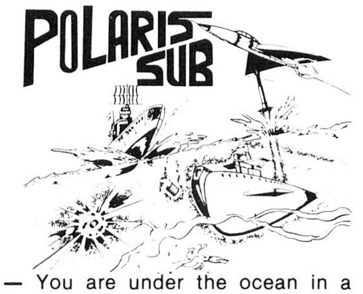

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Dungeon Adventure as the very best entry in the graphics division.

Gregory Ricketts is 19 years old and a freshman at Ohio State University. His sights are set on a degree in electrical engineering, but right now he's working part-time as a bagger at Kroger. He's a member of the Columbus and Central Ohio Color Computer Club and has a 32K Extended Basic Color Computer and a Line Printer VIII. He's in the local euchre club and, at this writing, was participating in a Ping Pong tournament.

Dungeon Adventure will be a chore to key in, and it takes a very long time to load and create a new dungeon. More in sympathy than as a "plug," we remind you that both winning programs are available on *Rainbow On Tape*.

Greg says this is the "first big program" he's done, and our hats are off to him for a superior job. We liked the title page. We liked the march song. We even think the funeral dirge is a refreshing change from the more frequent "Taps," at many games' end. We would like to have had more instructions, but we managed with those supplied. We would prefer a ROM pack, thank you, to the fretfully long loading time resulting from the ASCII format, but the *Dungeon Adventure* is worth waiting for. More details, including loading instructions, are provided with the program listing. Oh, yes, the objective is never really stated, but it's simple; stay alive and well as long as you can.

In our non-graphics division, Gregory Clark is the entrant, but he adds that he had a lot of help from his children in creating *Sir Randolf of the Moors*, our first-place finisher. Clark lives in Syracuse and is a technician with the New York Telephone Company. He bought his 32K machine a year ago, and this is his first contest. He hooks up to the TV in the family room except when the kids are using the Atari, at which time he is relegated to the black-and-white set. "My 11-year old son, Kevin, helped with some of the scenarios and did the de-bugging," says Clark, "while my 13-year old daughter, Terri, typed up the descriptions." Ten, single-spaced pages of documentation, mind you.

The judges, one and all, have high praise for *Sir Randolf*, which takes place in a castle and has 10 levels of difficulty. The "word pictures" are well written and the adventure holds new twists at each level of difficulty. The format, which requires typing the verb on the first line and entering before adding the noun on a second line is a bit cumbersome, but overall the adventure has many great features and you learn soon enough to pace yourself to the two-line entry format.

Congratulations to all three Clark family members for taking the top non-graphics honors.

Now, you be the judge. Try them yourself and let us know what you think. In the February issue, we'll share some of our judges' general observations, specific criticisms and suggestions for improvements.

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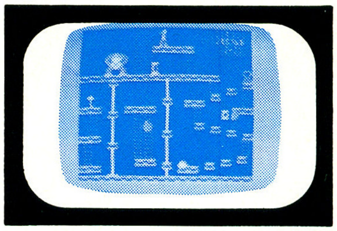

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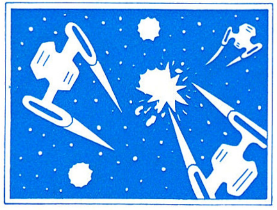

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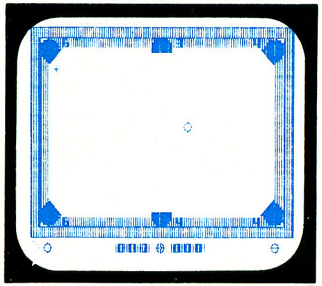

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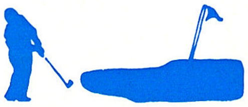

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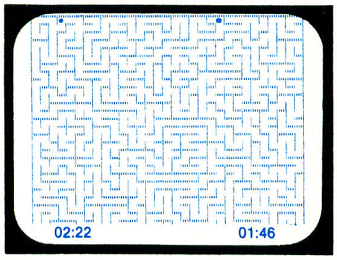

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In the year 974 AD was born a male child. The parents, being very poor even for peasants, indentured the child to their local lord.

The boy grew up within the castle walls, never seeing the outside world except through the tales of the knights, overheard while he fought with the castle dogs for scraps of food under the banquet tables.

Never having been given a proper name, he thought of himself as Sir Randolph of the Moors. All of his waking moments he envisioned himself as the victor of many jousts, and even as the leader of a band of knights on a quest for the king.

Being a rather husky young man, he was given the task of cleaning the lord's stables. Every chance he got, he learned to ride within the confines of the stable. This in itself showed a certain level of bravery, for if he was discovered even mounting a noble's steed he knew at the least it would mean a stout whipping.

One fateful day, he happened upon a complete suit of armor belonging to a knight visiting the castle. What possessed him to don the armor, even he had no idea. Once suited, the logical step would be to set astride the knight's horse.

As fate would have it, no sooner had he positioned himself on the horse than one of the castle dogs started barking. The high spirited animal immediately galloped out the open stable door and through the castle gates, carrying Sir Randolf with him.

"Oh, what tricks the lord plays on me," lamented Sir Randolf, when he finally regained control of the horse. He found himself many miles from the castle, in completely unfamiliar surroundings, realizing that if he returned to the castle, an unknown, but definitely unpleasant fate awaited him. After long deliberation, he decided to continue on the road and let fate do what she willed.

Hungry and weary, after several days of riding, he came upon a small village situated at the base of a towering mountain. Here, his physical needs overcame his natural fear of the unknown. He boldly rode into the town, and when he had reached the inn, he realized that a not-small group of townspeople had already formed around him. More came from every direction.

Helping hands assisted him from his mount and fairly carried him to the inn. He was taken to a table, and even before he was seated a large tankard of ale and a sizeable chunk of venison were placed before him.

Removing his helmet, he tried to explain his lack of funds. However, he was told that everything had been arranged and not to worry. Having failed in his protests, he began to devour the fare.

A commotion at the entrance interrupted his meal. Looking up, he spied a rather rotund man approaching. Speaking very rapidly he greeted Sir Randolf and thanked him for arriving so quickly. Randolf may have been short on worldliness, but he was bright enough to continue eating and just listen.

It seems the stranger was the equivalent to mayor of the village. Randolf soon pieced together an idea of what he had happened upon.

Near the peak of the mountain was a castle of an evil lord, Blandor. He had demanded and recevied heavy taxes for so many years that the village was now near collapse. Anyone opposing him was disposed of by either his guards or by some magical means. Recently it had been rumored that he had fallen ill and had died and his guards fearing loss of his magical protection had fled.

Three weeks ago, prior to this moment, the mayor had requested from a neighboring lord the services of a knight to explore the castle and prove the rumor true or false. The town's messenger, a not-too-bright lad, had forgotten most of the reply by the time he had returned. The only thing he was sure of was that the knight carried the sign of the unicorn on his shield.

Randolf now realized his situation: the mount and armor he had acquired belonged to the knight promised to the town. The townspeople were counting on him to go to the castle and discover exactly what was going on. He decided to attempt the quest himself.

After two days of rest, he mounted up and headed to the castle. After a few hours of travel, a dark-cloaked man appeared on the trail ahead of him. He introduced himself as Herman, former wizard to the evil Lord Blandor, who had discharged him after learning all he could of his craft.

Herman had observed Randolf and had correctly deduced his plight. In an attempt to help, he presented Randolf with a pea-sized ruby. The gem had the ability to break minor magical spells, but most of its power was exhausted. Only five charges were left. Now,Randolf was

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told to rub the stone if he felt magic was being used against him.

Herman also mentions that there may be something left in his former workship, but not to count on it, as Blandor had removed or destroyed most of his supplies just before casting him out. The ruby is the last magical object he has left.

Randolf now stands before the castle of Blandor. An ignorant, but not stupid stable boy, he is ready to attempt the work meant for a fully-trained knight. All he has with him is the sword, dagger, a small belt pouch from the knight's equipment, and the ruby from Herman. The armor he has left in town, finding it too confining.

There you have the situation. Randolf is a healthy young man, strong of heart and spirit, but sadly lacking in any knowledge needed to complete his quest.

It is up to you to guide Randolf along the way. He will show no initiative, including self-preservation. You will be in total control and must make your instructions very simple and, at the same time, precise. If Randolf knows an object by one name, for example, he will not react to another common name for the same object.

He best follows instructions given in two parts.

First, tell him what action you wish him to perform, and then specify to or with what. For example: The instruction "lift up the black pot" will only confuse him. However, just the word "lift" and then the word "pot" will get the desired results.

Some one word commands will also be understood.

"*VIEW*" will give a general description of the present location should Randolf forget where he is.

"*LIST*" will get you all the objects Randolf is carrying—that he can see.

Randolf will tell you which ways he can see to move. To get him to move, just give him the first letter of the direction. For example, to have him move north, just give him the letter 'N' and he will go north.

Just remember, Randolf will only do what you tell him—no more, no less.

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13 UNLOCK
14 STAND
15 PULL
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CHAPEL HILL, NC 27514

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```
1 '=======
2 '==NON GRAPHICS ADVENTURE==
3 '===FOR "THE RAINBOW"======
4 '=========CONTEST==========
5 '=====BY GREGORY CLARK=====
6 '=====122 MALE AVENUE======
7 '=SYRACUSE,NEW YORK,13219==
8 '======315-487-8406========
9 '===WRITTEN AUGUST 1982====
10 '=WITH MUCH HELP FROM KEVIN=
11 '**PCLEAR 1 BEFORE LOADING**
12 '*FOR 32K MEMORY-EXT BASIC**
13 '==========================
14 PRINT:CLS:PRINT@228,"SIR RAND
OLF OF THE MOORS":FORX=1TO200:PL
AY"L200DDA":NEXT
15 CLS:PRINT:PRINT:PRINT:PRINT:P
RINT;"-----------SKILL LEVEL----
-----"
16 PRINT:PRINT;">>>>SELECT DIGIT
 FROM 0 TO 9<<<<"
17 PRINT:PRINT;"ZERO (0) = EASIE
ST"
18 PRINT;"NINE (9) = HARDEST"
19 PRINT:PRINT:INPUT"ENTER CHOIC
E";Q
20 Q1=INT(Q)
21 IF Q1>9 OR Q1<0 THEN CLS:PRIN
T;"     INPUT MUST BE AN INTEGER
            IN RANGE OF 0 TO 9":SO
UND100,3:GOTO15
22 CLS:PRINT@232,"JUST A MOMENT"
23 DIM A$(10),B$(30),C$(40),V(12
)
24 HV=3:VV=5:LV=3:N=1:S=1:E=1:W=
1:U=1:D=1:Y=1:WA=1
25 RB=1:FT=1:SW=1:DA=1:RU=5:DR=1
:D3=1:D4=1:ST=1
26 FORX=1TO10:READA$(X):PLAY"L20
0;D":NEXTX
27 FORX=1TO30:READB$(X):PLAY"L20
0;C":NEXT
28 FORX=1TO40:READC$(X):PLAY"L20
0;F":NEXTX:CLS
29 GOTO304
30 PRINT;" %%%%%%%%%%%%%%%%%%%%%
%%%%%%%%":PLAY"L150;FP10F":INPUT
"WHAT DO YOU WANT TO DO
 ";D$
31 IF DI=1 AND WA=1 AND HV=1 AND
 VV=1 THEN TJ=TIMER:IF TJ-1000 >
 TI THEN 281
32 IFD$="VIEW"THEN304
33 IFD$="HELP"THEN50
34 IF Y=9 THEN WJ=WJ+1:IF WJ>15-
(Q1+1) THEN324
35 IFD$="N"THEN287
36 IFD$="S"THEN287
37 IFD$="E"THEN287
```

You've invested a lot of time and money into your computer . . .

It's time that investment paid off!

THE COLOR ACCOUNTANT

The Programmer's Institute introduces **THE COLOR ACCOUNTANT,** the only complete personal financial packa specifically designed for the TRS-80 COLOR computer. This unique package includes:

1. Complete Checkbook Maintenance
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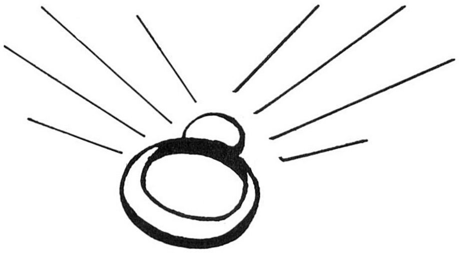
```
38 IFD$="W"THEN287
39 IFD$="U"THEN287
40 IFD$="D"THEN287
41 IFD$="DIVE"THEN45
42 IFD$="LIST"THEN52
43 PLAY"L150;G;P10;G":INPUT"";E$
44 G$=LEFT$(E$,4)
45 FORA=1TO30
46 F$=LEFT$(D$,4):IF F$=B$(A) TH
EN49
47 NEXTA
48 PRINT;"I CANNOT ";D$:PLAY"L20
0;DP10CP10DP6":GOTO30
49 ON A GOTO 67,104,107,109,111,
113,122,125,128,136,138,141,168,
176,180,187,190,219,221,226,232,
240,243,249,260,268,270,275,277,
283
50 'START HELP SECTION
51 PRINT;"HELP"
52 'LIST
53 PRINT;"I AM CARRYING"
54 IF SW=1 THENPRINT;"A SWORD"
55 IF DA=1 THENPRINT;"A DAGGER"
56 IF RB=1 THENPRINT;"THE MAGIC
RUBY"
```



```
57 IF OC=1 THENPRINT"THE OCTAGON
 OF GOLD"
58 IF HE=1 THENPRINT"THE HEXAGON
 OF GLASS"
59 IF NE=1 THENPRINT"THE PENTAGO
N NECKLACE"
60 IF LA=1 THENPRINT"THE LANCE"
61 IF KE=1 THENPRINT"THE KEY OF
GOLD
62 IF RI=1 THENPRINT"THE INVISIB
ILITY RING"
63 IF SK=1 THENPRINT"THE SACK OF
 MARBLES"
64 IF FT=1 THENPRINT"FLINT AND T
INDER"
65 GOTO30:'END OF LIST
66 PRINT;"SORRY!!-NO HELP FOR YO
U NOW":GOTO30:'END HELP SECTION
67 'LOOK
68 IF LV=1 AND VV=1 AND HV=1 AND
 WA=0 AND D1=0 AND SL=0 THEN 69
ELSE 72
69 IFG$=C$(9) THEN PRINT;"IT'S J
UST A SLIPPERY,FOUL SMELL-ING,GR
EENISH SLIME":GOTO30
70 IFG$=C$(10) THEN PRINT;"THERE
 APPEARS TO BE AN OUTLINE  OF WH
AT MAY BE A DOOR UNDER THE SLIME
":GOTO30
71 IFG$=C$(11) THENPRINT;"THERE'
S TOO MUCH SLIME COVERING IT TO
TELL MUCH":GOTO30
72 IF LV=1 AND VV=1 AND HV=1 AND
 WA=0 AND D1=0 AND SL=1 THEN 73E
LSE76
73 IF G$=C$(11) THENPRINT;"IT'S
A DOOR WITH A SMALL RING.":GOTO3
0
74 IFG$=C$(10) THENPRINT;"THE OU
TLINE IS MORE DEFINATE":GOTO30
75 IFG$=C$(12) THENPRINT;"IT'S J
UST A RING ABOUT 3 INCHES ACROSS
":GOTO30
76 IFG$=C$(14) AND VV=4 AND HV=1
 AND LV=4 THENPRINT"THE STAIRS T
HAT ARE THERE ARE   COVERED WITH
 DUST":GOTO30
77 IF LV=2 AND HV=3 AND VV=3 THE
N78ELSE84
78 IFG$=C$(16) THENPRINT"I SEE N
OTHING MORE THAN I HAVE  ALREADY
 TOLD":GOTO30
79 IFG$=C$(17) THENPRINT"THEY AR
E COVERED WITH MANY LINESAND SHA
PES.":GOTO30
80 IFG$=C$(18) AND DW=0 THENPRIN
T"JUST DRAWERS-THEY ARE CLOSED":
GOTO30
81 IFG$=C$(18) THENPRINT"IT CONT
AINS A RING.":GOTO30
82 IFG$=C$(6) AND DW=1 THENPRINT
"FROM WHAT THE PICTURES ENGRAVED
 ON IT SHOW,I THINK THE WEARER O
FIT IS NOT ABLE TO BE SEEN,BUT
 IT ALSO COULD MEAN THAT IF IT I
SPUT ON,THE WEARER IS KILLED. ON
ETHING FOR SURE-IT ONLY WORKS ON
ETIME":GOTO30
83 IFG$=C$(19) OR G$=C$(20) THEN
PRINT"ALL I CAN SAY IS THERE ARE
 MANY OF THEM AND I WOULD HAVE N
O WAY OF FIGURING OUT WHAT MAY B
E IN  ANY SINGLE ONE OF THEM.":G
OTO30
84 IF LV=4 AND VV=3 AND HV=3 THE
N85 ELSE87
85 IFG$=C$(23) AND ST=1 THENPRIN
T"JUST A STATUE MADE OF QUARTZ":
GOTO30
86 IF G$=C$(23) THENPRINT;"I SEE
 A KEY-IT MUST HAVE BEEN   UNDER
 THE STATUE":GOTO30
87 IF G$=C$(24) AND ST=0 THENPRI
```

Telewriter-64™
the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

> *...one of the best programs for the Color Computer I have seen...*
> — Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting. Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

> *...truly a state of the art word processor... outstanding in every respect.*
> — The RAINBOW, Jan. 1982

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You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

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Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add $2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

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```
NT"IT IS MADE OF GOLD.THE HANDLE
 ISSHAPED AS A CLOVER LEAF AND T
HE OTHER END IS FORMED INTO THE
   SHAPE OF A CROSS.":GOTO30
88 IFG$=C$(26) AND LV=4 AND VV=3
 AND HV=5 THEN PRINT"ONE PLANK S
EEMS TO BE LOOSE":GOTO30
89 IF LV=5 AND HV=3 AND VV=1 AND
 G$=C$(31) THENPRINT"THERE ARE T
HREE HOLES IN THE    BLOCK.":GOT
O30
90 IF G$=C$(32) AND LV=3 AND VV=
4 AND HV=2 THEN91ELSE94
91 IF CH=0 THENPRINT"IT'S JUST A
 SMALL CHEST.":GOTO30
92 IF CH=1 AND HE=0 THENPRINT"TH
ERE IS A HEXAGON OF GLASS IN  TH
E CHEST.":GOTO30
93 IF CH=1 AND HE=1 THENPRINT"TH
E CHEST IS EMPTY":GOTO30
94 IF G$=C$(35) AND LA=1 THENPRI
NT"IT IS MADE OF A WOODEN SHAFT
   ABOUT TWO ARM-SPANS LONG WITH
 A SHARP METAL POINT.":GOTO30
95 IF G$=C$(36) AND LV=5 AND VV=
1 AND HV=3 THENPRINT"THERE ARE T
HREE HOLES-HEXAGON,  OCTAGON AND
 PENTAGON IN SHAPE.":GOTO30
96 IF LV=5 AND HV=3 AND VV=2 AND
 G$=C$(37) THENPRINT"THE BODY OF
 BLANDOR LIES UPON   THE ALTAR.Y
OUR QUEST IS FINISHED":PRINT:PRI
NT"CONGRATULATIONS!!":FORX=1TO50
00:NEXT:CLS:END
97 IF G$=C$(25) AND LV=4 AND HV=
4 AND VV=3 THEN PRINT"IT IS SOLI
D METAL-THE SURFACE ISFEATURELES
S EXCEPT FOR A SMALL  CROSS-SHAP
ED HOLE IN THE CENTER.":GOTO30
98 IF Y=6 AND G$=C$(38) THENPRIN
T"THEY ARE ALL SHARP-EXCEPT ONE-
   THAT PARTICULAR SPIKE IS BLUNT
.":GOTO30
99 IF G$=C$(40) AND SK=1 THENPRI
NT"JUST A WORN,BROWN LEATHER SAC
K  WITH A DRAW-STRING TIE.":GOTO
30
100 IF LV=3 AND E$="MOAT" THENPR
INT"THE CROCODILES LOOK VERY HUN
GRY.":GOTO30
101 IF Y=3 AND G$=C$(7) THENPRIN
T"I DON'T REALLY WANT TO-":GOTO3
0
```

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```
102 IF E$="GOBLINS" THENPRINT"EA
CH ONE HAS A SWORD IN ONE HANDAN
D THE OTHER HAND IS EXTENDED  OU
T-PALM UP.":GOTO30
103 PRINT;"I DON'T SEE ANYTHING
SPECIAL":GOTO30
104 'SLAY
105 IF E$="DRAGON" THENPRINT"YOU
 MUST BE KIDDING!":GOTO30
106 PRINT"I CAN'T":GOTO30
107 'JUMP
108 PRINT;"I CAN'T JUMP OVER THA
T!":GOTO30
109 'LISTEN
110 PRINT;"I DON'T HEAR ANYTHING
 OUT OF THEORDINARY":GOTO30
111 'SAY
112 PRINT;"I SAID '";E$;"'":PRIN
T;"BUT NOTHING HAPPENED":GOTO30
113 'RUB
114 IF RU<1 THEN PRINT;"IT IS PO
WERLESS-YOU HAVE USED  ALL FIVE
 CHARGES":GOTO30
115 IF LV=1 AND Y=3 THEN116ELSE1
18
116 IF G$=C$(5) THEN PRINT;"THE
RUBY IS CHANGING COLORS AND GIVI
NG OFF A HUMMING SOUND.THE  SCOR
PIANS ARE CHANGING COLORS   ALON
G WITH THE GEM."
117 PRINT;"SUDDENLY AS THEY CAME
 THEY HAVE TURNED INTO HARMLESS
ANTS AND   SCURRIED OFF INTO THE
 CRACKS IN THE WALLS.":Y=1:B3=1:
RU=RU-1:GOTO304
118 IF Y=4 AND G$=C$(5) THENPRIN
T"THE RUBY IS HUMMING AND CHANGI
NGCOLORS-":FORX=1TO1000:NEXT:PRI
NT"THE FLAMES HAVE GONE!":Y=1:B4
=1:RU=RU-1:GOTO304
119 IFY=7 AND G$=C$(5) THENPRINT
"THE RUBY IS GIVING OFF A HUMING
 SOUND-":FORX=1TO1000:NEXT:PRINT
"THERE,I CAN MOVE AGAIN.":Y=1:B7
=1:RU=RU-1:GOTO304
120 IF G$=C$(5) THEN RU=RU-1
121 PRINT;"I TRIED - BUT I'M AFR
AID NOTHINGWAS ACCOMPLISHED BY I
T":GOTO30
122 'TURN
123 IF G$=C$(30) AND MI=0 AND LV
=3 AND VV=3 AND HV=4 THENPRINT"I
T'S TURNING-":PRINT"THE WALL NEX
T TO THE MIRROR IS  OPENING.":T=
0:O=5:GOTO447
124 PRINT;"NOTHING HAPPENED":GOT
O30
125 'LIFT
126 IF G$=C$(27) AND LV=4 AND VV
=3 AND HV=5 AND OC=0 THENPRINT"T
HERE IS AN OCTAGON SHAPED PIECEO
F GOLD UNDER THE PLANK.":GOTO30
127 PRINT;"CAN'T":GOTO30
128 'CUT
129 PLAY"L200;DDA":INPUT"WITH WH
AT";H$
130 IF H$="SWORD" OR H$="DAGGER"
 THEN 131 ELSE PRINT;"NOTHING HA
PPENED":GOTO30
131 IF LV=1 AND Y=2 AND G$=C$(1)
 THEN133ELSE132
132 IF LV=1 AND Y=2 AND G$=C$(2)
 THEN133ELSE134
133 PRINT;"IT'S NOT WORKING-THE
";H$:PRINT;"IS NOW CAUGHT IN THE
 WEB":GOTO30
134 '
135 PRINT"NOTHING HAPPENED":GOTO
30
136 'STAB
137 PRINT;"I STABBED THE ";E$:PR
INT;"BUT NOTHING HAPPENED":GOTO3
0
138 'CLIMB
139 IF Y=5 AND G$=C$(39) THENPRI
NT"THE BARS MUST STAY IN PLACE A
S  LONG AS THERE IS WEIGHT UPON
THEFLOOR! THE BARS HAVE GONE BAC
K.":B5=1:Y=1:GOTO304
140 PRINT;"I CAN'T CLIMB IT":GOT
O30
141 'GET
142 IF VV=1 AND HV=1 AND LV=1 AN
D WA=1 THEN PRINT;"I CAN'T":GOTO
```

CO BALLOONY fun!
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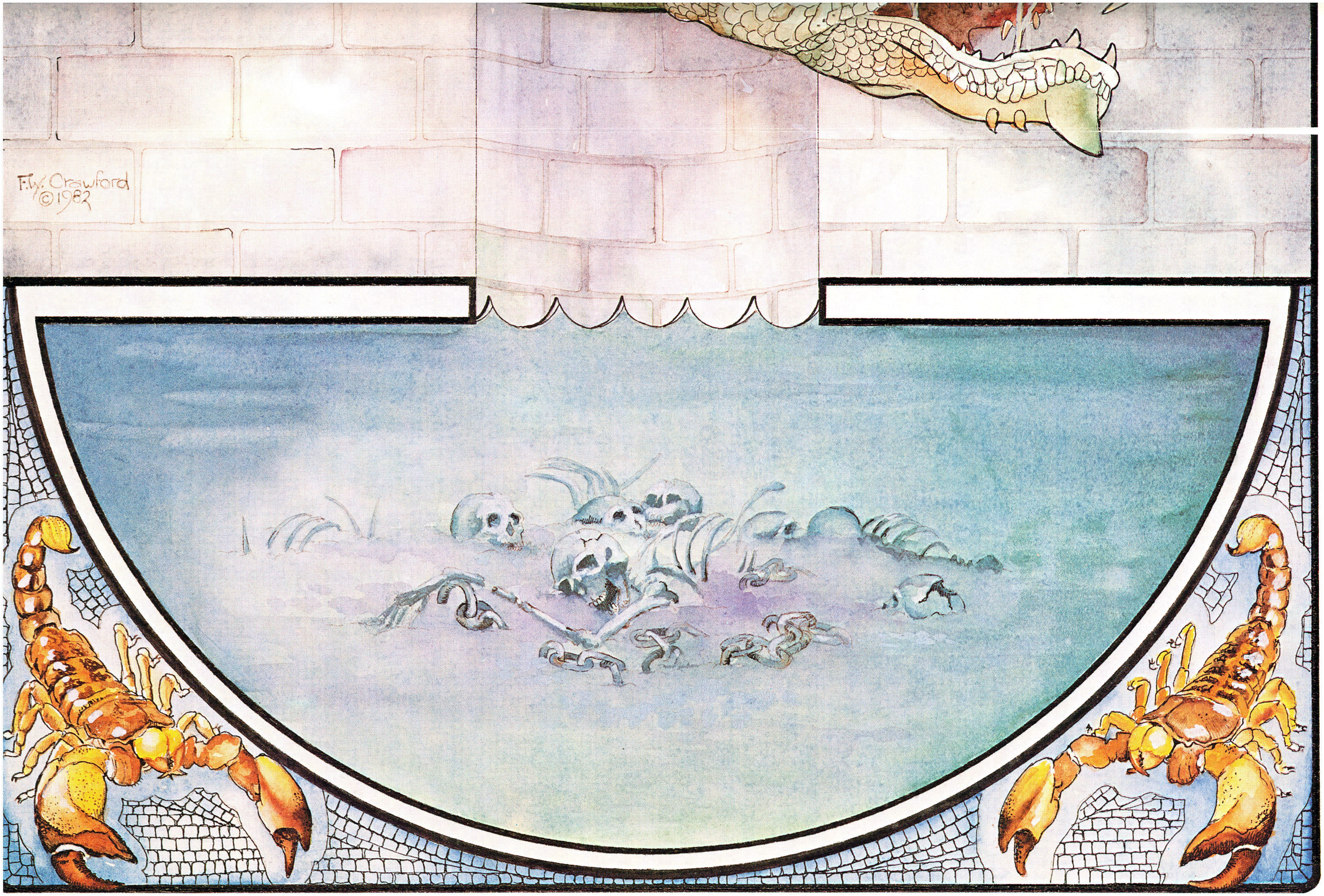
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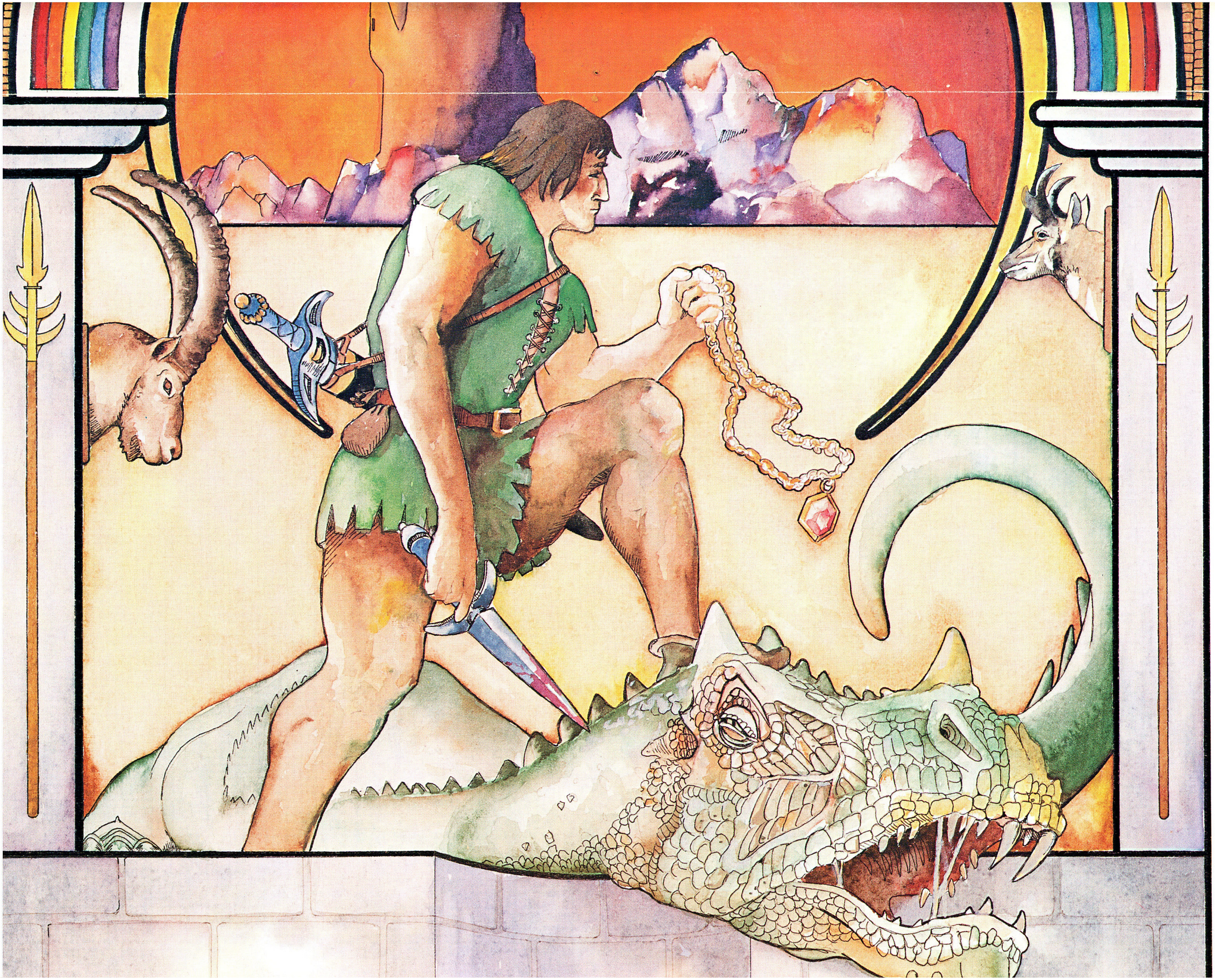

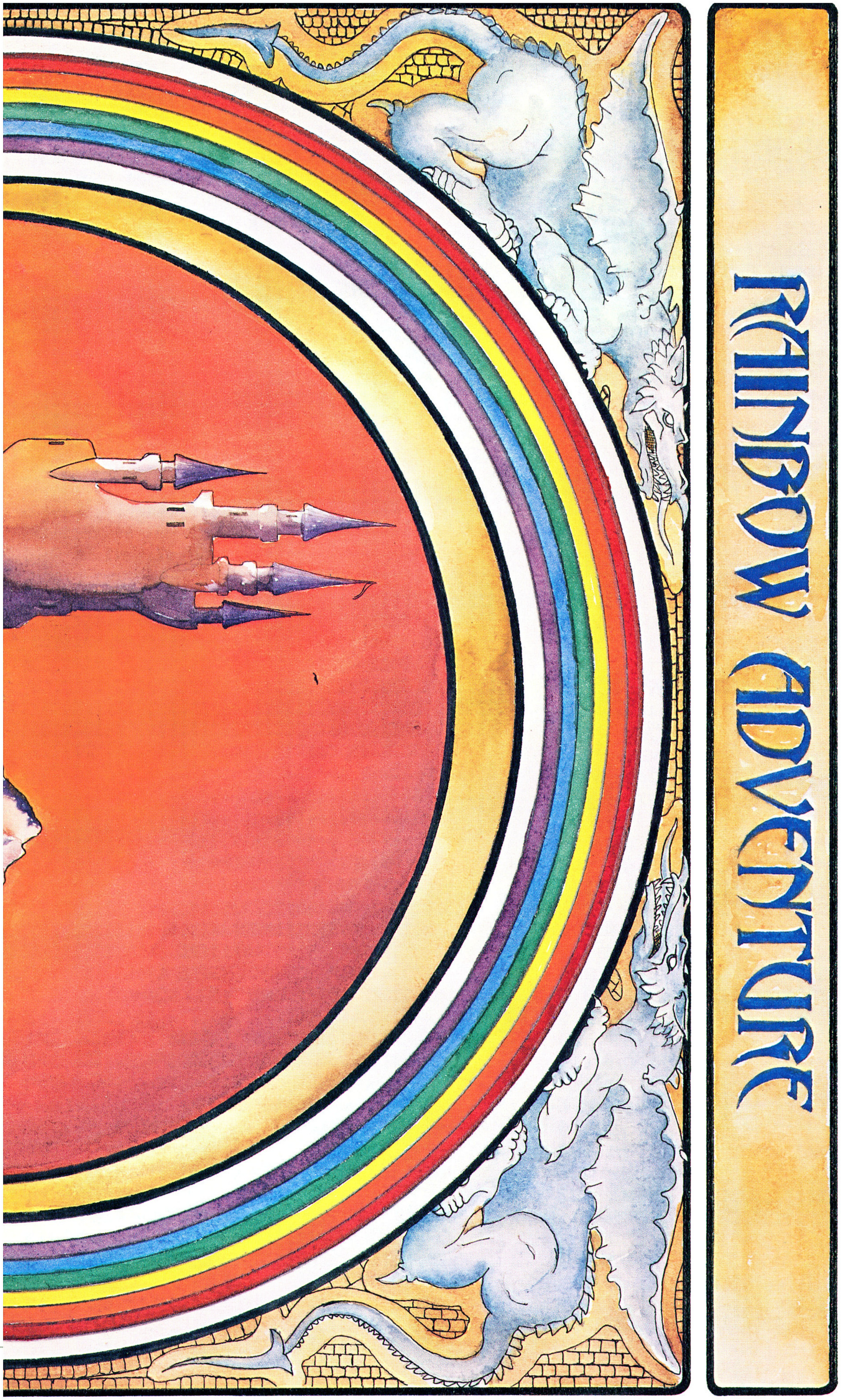
RAINBOW ADVENTURE

```
30
143 W1=VV*HV*LV
144 IF G$=C$(3) AND V1=W1 AND SW
=3 THEN PRINT;"I'VE GOT IT":SW=1
:GOTO30
145 IF G$=C$(4) AND V2=W1 AND DA
=3 THEN PRINT;"I'VE GOT IT":DA=1
:GOTO30
146 IF G$=C$(5) AND V3=W1 AND RB
=3 THEN PRINT;"I'VE GOT IT":RB=1
:GOTO30
147 IF G$=C$(12) AND V4=W1 AND F
T=3 THEN PRINT;"I'VE GOT IT":FT=
1:GOTO30
148 IF G$=C$(6) AND V5=W1 AND RI
=3 THEN PRINT;"I'VE GOT IT":RI=1
:GOTO30
149 IF G$=C$(13) AND V6=W1 AND N
E=3 THEN PRINT;"I'VE GOT IT":NE=
1:GOTO30
150 IF G$=C$(40) AND V7=W1 AND S
K=3 THENPRINT"I'VE GOT IT":SK=1:
GOTO30
151 IF G$=C$(35) AND V8=W1 AND L
A=3 THENPRINT"I'VE GOT IT":LA=1:
GOTO30
152 IF G$=C$(33) AND V9=W1 AND H
E=3 THENPRINT"I'VE GOT IT":HE=1:
GOTO30
153 IF G$=C$(21) AND V10=W1 AND
NE=3 THENPRINT"I'VE GOT IT":NE=1
:GOTO30
154 IF G$=C$(24) AND V11=W1 AND
KE=3 THENPRINT"I'VE GOT IT":KE=1
:GOTO30
155 IF G$=C$(28) AND V12=W1 AND
OC=3 THENPRINT"I'VE GOT IT":OC=1
:GOTO30
156 IFG$=C$(15) AND VV=4 AND HV=
1 AND LV=4 THENPRINT"I'VE GOT A
HANDFULL OF DUST":DU=1:GOTO30
157 IF G$=C$(24) AND KE=0 AND LV
=4 AND VV=3 AND HV=3 AND ST=0 TH
ENPRINT"I'VE GOT THE KEY.":KE=1:
GOTO30
158 IF G$=C$(22) AND ST=1 AND LV
=4 AND VV=3 AND HV=3 THENPRINT"O
W! SOMETHING PRICKED ME-":FORX=1
TO1500:NEXT:CLS(0):FORX=1TO500:N
EXT:CLS:END
159 IF G$=C$(28) AND OC=1 THENPR
INT"I'VE ALREADY GOT IT.":GOTO30
160 IF G$=C$(28) AND LV=4 AND VV
=3 AND HV=5 THENPRINT"I'VE GOT T
HE OCTAGON.":OC=1:GOTO30
161 IFG$=C$(6) AND LV=2 AND VV=3
 AND HV=3 AND DW=1 THENPRINT"I P
UT THE RING ON MY FINGER. I  GUE
SS THAT MEANS I'M INVISIBLE- BUT
 FOR HOW LONG?":RI=1:GOTO30
162 IF G$=C$(35) AND LV=3 AND VV
=3 AND HV=2 AND LA=0 THENPRINT"I
'VE GOT THE LANCE":LA=1:GOTO30
163 IF G$=C$(33) AND HE=0 AND CH
=1 AND LV=3 AND HV=2 AND VV=4 TH
ENPRINT"I'VE GOT THE HEXAGON OF
GLASS.":HE=1:GOTO30
164 IF LV=2 AND VV=5 AND HV=5 AN
D G$=C$(40) THEN 165ELSE167
165 IF SK=1 THENPRINT"I'VE ALREA
DY GOT IT":GOTO30
166 IF SK=0 THENPRINT"I'VE GOT T
HE SACK":SK=1:GOTO30
167 PRINT;"I CAN'T GET THE ";E$:
GOTO30
168 'UNLOCK
169 PRINT;"UNLOCK THE ";E$:LINEI
NPUT"WITH WHAT? ";M$
170 IF G$=C$(25) AND LV=4 AND HV
=4 AND VV=3 THEN171ELSE174
171 IF D3=0 THENPRINT"IT'S ALREA
DY OPEN.":GOTO30
172 IF M$="KEY" AND KE=0 THENPRI
NT"I DON'T HAVE THE KEY.":GOTO30
173 IF M$="KEY" AND KE=1 THENPRI
NT"IT WORKED! THE DOOR SWUNG OPE
N.":D3=0:T=0:O=10:GOTO447
174 '
175 PRINT;"THE ";E$;" WON'T UNLO
CK":PRINT;"WITH THE ";M$:GOTO30
176 'STAND
177 IF G$=C$(21) AND LV=2 AND VV
=5 AND HV=2 AND NE=1 THENPRINT"E
VERYTHING IS FUZZY-":FORX=1TO150
0:NEXTX:LV=4:HV=1:VV=2:GOTO304
178 IF G$=C$(21) AND LV=4 AND HV
=1 AND VV=2 AND NE=1 THENPRINT"E
VERYTHING IS FUZZY-":FORX=1TO150
0:NEXT:LV=2:HV=2:VV=5:GOTO304
179 PRINT"I CAN'T":GOTO30
180 'PULL
181 IF DI=1 AND G$=C$(8) THEN PR
INT;"IT CAME LOOSE FROM THE BOTT
OM.  THE WATER IS NOW SWIRLING A
ROUNDAND AROUND! IT'S ALL GOING
OUT  OF A SORT OF DRAIN IN THE F
LOOR.THERE! IT'S ALL GONE-I'M ON
 THE FLOOR OF THE PIT."
182 IF DI=1 AND G$=C$(8) THEN PR
INT;"I SEEM TO BE STANDING ON A
PILE OF RUBBLE. IT'S TOO DARK TO
 TELLWHAT IT IS,BUT FROM THE SME
LL I DON'T CARE TO KNOW":DI=0:WA
=0:T=0:O=0:GOTO447
183 IF VV=1 AND HV=1 AND LV=1 AN
D WA=0 THEN184ELSE185
184 IF D1=0 AND G$=C$(6) THEN PR
INT;"IT'S VERY HEAVY AND THE HIN
GES  ARE RUSTED,BUT I WAS ABLE T
O GETIT OPEN ENOUGH TO GET OUT."
```

```
:D1=1:T=0:O=2:GOTO447
185 '
186 PRINT;"I CAN'T PULL IT":GOTO
30
187 'PUSH
188 IF Y=6 AND G$=C$(38) THENPRI
NT"THE WALL IS MOVING BACK! AND
THEDOORWAYS HAVE RE-APPEARED.":B
6=1:Y=1:GOTO304
189 PRINT;"I CAN'T PUSH IT":GOTO
30
190 'DROP
191 IF G$=C$(5) THENPRINT"I WON'
T DROP THE RUBY-HERMAN    TOLD M
E I MAY NEED IT.":GOTO30
192 IF G$=C$(3) AND SW=1 THEN SW
=2:GOTO205
193 IF G$=C$(4) AND DA=1 THEN DA
=2:GOTO205
194 IF G$=C$(5) AND RB=1 THEN RB
=2:GOTO205
195 IF G$=C$(6) AND RI=1 THEN RI
=2:GOTO205
196 IF G$=C$(12) AND FT=1 THEN F
T=2:GOTO205
197 IF G$=C$(13) AND NE=1 THEN N
E=2:GOTO205
198 IF G$=C$(40) AND SK=1 THEN S
K=2:GOTO205
199 IF G$=C$(35) AND LA=1 THEN L
A=2:GOTO205
200 IF G$=C$(33) AND HE=1 THEN H
E=2:GOTO205
201 IF G$=C$(21) AND NE=1 THEN N
E=2:GOTO205
202 IF G$=C$(24) AND KE=1 THEN K
E=2:GOTO205
203 IF G$=C$(28) AND OC=1 THEN O
C=2:GOTO205
204 PRINT;"I DON'T HAVE IT":GOTO
30
205 PRINT;"I DROPPED IT-I HOPE Y
OU REMEMBERWHERE IT IS I DROPPED
 IT.        THE FLOORS ARE IN SHA
DOW AND I  MAY NOT BE ABLE TO SE
E IT IF I  COME BACK LOOKING FOR
 IT."
206 IF SW=2 THEN V1=VV*HV*LV:SW=
3:GOTO30
207 IF DA=2 THEN V2=VV*HV*LV:DA=
3:GOTO30
208 IF RB=2 THEN V3=VV*HV*LV:RB=
3:GOTO30
209 IF FT=2 THEN V4=VV*HV*LV:FT=
3:GOTO30
210 IF RI=2 THEN V5=VV*HV*LV:RI=
3:GOTO30
211 IF NE=2 THEN V6=VV*HV*LV:NE=
3:GOTO30
212 IF SK=2 THEN V7=VV*HV*LV:SK=
3:GOTO30
213 IF LA=2 THEN V8=VV*HV*LV:LA=
3:GOTO30
214 IF HE=2 THEN V9=VV*HV*LV:HE=
3:GOTO30
215 IF NE=2 THEN V10=VV*HV*LV:NE
=3:GOTO30
216 IF KE=2 THEN V11=VV*HV*LV:KE
=3:GOTO30
217 IF OC=2 THEN V12=VV*HV*LV:OC
=3:GOTO30
218 PRINT;"I HAVEN'T GOT IT":GOT
O30
219 'CARRY
220 PRINT;"I CAN'T CARRY THAT":G
OTO30
221 'BRIBE
222 RR$=""
223 IF LV=5 AND Y=9 AND SK=1 AND
 LEFT$(E$,5)="GUARD" THEN INPUT"
WITH WHAT";RR$:IF RR$="MARBLES"
THENPRINT"THAT SATISFIED THEM.TH
EY WENT   BACK DOWN THE HALL ARG
UING OVER WHICH ONE WOULD GET TH
E BLUE    TIGER-EYE.":Y=1:B9=1:G
OTO304
224 IFRR$=""THEN INPUT"WITH WHAT
";RR$
225 PRINT"I GUESS THEY DON'T WAN
T THAT!":GOTO30
226 'BREAK
227 IF LV=1 AND Y=2 THEN 228ELSE
230
228 IF G$=C$(1) OR G$=C$(2) THEN
 229ELSE230
229 PRINT;"IT'S MUCH TOO STRONG
TO BREAK":GOTO30
230 '
231 PRINT;"I TRIED TO BREAK THE
";E$:PRINT"BUT NOTHING HAPPENED.
":GOTO30
232 'HIT
233 PRINT;"HIT THE ";E$:LINEINPU
T"WITH WHAT? ";J$
234 IF G$=C$(22) AND HV=3 AND VV
=3 AND LV=4 THEN 235ELSE238
235 IF J$="DAGGER" OR J$="SWORD"
 THEN 236 ELSE 238
236 IF ST=1 THENPRINT"THE STATUE
 SMASHED INTO MANY    PIECES,A M
ECHANISM WITH A NEEDLEATTACHED F
ELL TO THE FLOOR.":ST=0:GOTO30
237 PRINT"THE STATUE IS ALREADY
SMASHED.":GOTO30
238 '
239 PRINT;"I HIT THE ";E$:PRINT;
"WITH THE ";J$:PRINT;"BUT IT DID
N'T DO ANYTHING":GOTO30
240 'DIG
241 PRINT"DIG THE ";E$:LINEINPUT
```

```
"WITH WHAT? ";K$
242 PRINT;"I TRIED TO DIG THE ";
E$:PRINT;"WITH THE ";K$:PRINT;"B
UT I WAS UNABLE TO DO IT":GOTO30
243 'BURN
244 PLAY"L200;DDA":INPUT"WITH WH
AT";I$
245 IFI$="FLINT AND TINDER" THEN
246ELSE248
246 IF LV=1 AND Y=2 THEN247ELSE2
48
247 IF G$=C$(1) OR G$=C$(2) THEN
 PRINT;" IT ALL BURNED UP IN A F
LASH!":B2=1:Y=1:GOTO304
248 PRINT"USING THE ";L$:PRINT;"
THE ";E$;" WON'T BURN":GOTO30
249 'OPEN
250 IF G$=C$(18) AND LV=2 AND HV
=3 AND VV=3 THEN INPUT"WHICH DRA
WER? TOP OR BOTTOM      ";DW$:IFD
W$="BOTTOM"THENPRINT"THERE IS A
YELLOW GAS COMING OUTFROM THE DR
AWER. I CAN'T SEE OR HEAR ANYTHI
NG!":FORX=1TO3000:NEXT:CLS(0):FO
RX=1TO500:NEXT:CLS:END
251 IF DW$="TOP" THENPRINT;"IT'S
 OPEN":DW=1:DW$="":GOTO30
252 IF G$=C$(32) AND LV=3 AND HV
=2 AND VV=4 THEN253ELSE258
253 INPUT"WITH WHAT";ZX$:IFZX$="
LANCE"THEN254ELSE256
254 IF LA=1 THENPRINT"JUST AS TH
E TOP OF THE CHEST    OPENED A L
ARGE BLACK SPIDER CAMEOUT AND DI
SAPPEARED INTO THE    CLUTTER IN
 THE REAR OF THE ROOM.":CH=1:GOT
O30
255 PRINT"I DON'T HAVE A LANCE":
GOTO30
256 IF ZX$="SWORD" OR ZX$="DAGGE
R" OR ZX$="HAND" THENPRINT"A BLA
CK SPIDER JUMPED FROM THE  CHEST
 AND BIT ME.IT'S HARD TO   BREAT
HE":FORX=1TO2000:NEXT:CLS(0):FOR
X=1TO500:NEXT:CLS:END
257 PRINT"IT WON'T OPEN":GOTO30
258 IF SK=1 AND G$=C$(40) THENPR
INT"IT CONTAINS ONLY A FEW WORTH
LESSMARBLES.":GOTO30
259 PRINT;"I CAN'T OPEN THE ";E$
:GOTO30
260 'PUT
261 INPUT"WHERE";XX$
262 IF XX$="HOLE" AND HE=1 AND O
C=1 AND NE=1 THEN 266ELSE263
263 IF XX$="HOLE" AND D4=1 AND L
V=5 AND VV=1 AND HV=3 THEN264ELS
E267
264 IF NE=1 OR OC=1 OR HE=1 THEN
265ELSE267
265 IF G$=C$(33) OR G$=C$(21) OR
 G$=C$(28) THENPRINT"IT FIT OK,B
UT NOTHING HAPPENED":GOTO30
266 IF G$=C$(33) OR G$=C$(21) OR
 G$=C$(28) THEN PRINT"I PUT ALL
THREE IN THE CORRECT  PLACES AND
 A SECTION OF WALL    SLID OPEN.
":T=0:O=8:D4=0:GOTO447
267 PRINT"I CAN'T":GOTO30
268 'SMELL
269 PRINT;"I JUST SMELL A(N) ";E
$:GOTO30
270 'SPRINKLE
271 PRINT;"SPRINKLE THE ";E$:LIN
E INPUT"ON WHAT? ";O$
272 IF TS=0 AND DU=1 AND VV=4 AN
D HV=1 AND LV=4 AND G$=C$(15) AN
D O$="STAIRS" THEN PRINT"AS THE
DUST HITS THE MISSING    STAIRS
IT SPARKLES-OUTLINING THEWHOLE S
TAIRWAY.IN FACT NOW THE  STAIRWA
Y IS COMPLETELY VISABLE.":T=1:O=
1:TS=1:GOTO447
273 IF O$="STAIRS" AND DU=0 THEN
PRINT"I DON'T HAVE ANY DUST.":GO
TO30
274 PRINT;"I SPRINKLED THE ";E$:
PRINT;"ON THE ";O$:PRINT;"NOTHIN
G HAPPENED":GOTO30
275 'KICK
276 PRINT"OUCH!!":GOTO30
277 'DIVE
278 IF LV>1THEN282
279 IF WA=1 AND VV=1 AND HV=1 TH
EN PRINT;"THE COLD WATER IS ABOU
T 15 FEET DEEP. AT THE BOTTOM IS
 A LOT OF STUFF,BUT IT IS TOO DA
RK TO SEE WHAT IT IS. I ONLY REC
OGNIZE A  PIECE OF CHAIN. PLEASE
 HURRY-I  CAN'T HOLD MY BREATH T
OO LONG!":DI=1
280 IF WA=1 AND VV=1 AND HV=1 TH
EN TI=TIMER:GOTO30
281 IF WA=1 AND VV=1 AND HV=1 TH
ENPRINT;"YOU TOOK TOO LONG-I COU
LDN'T    STAY DOWN ANY LONGER-I'
M BACK ONTHE SURFACE.":DI=0:GOTO
30
282 PRINT;"I CAN'T":GOTO30
283 'WIPE
284 IF VV=1 AND WA=0 AND HV=1 AN
D D1=0 AND LV=1 AND G$=C$(9) THE
NPRINT;"IT'S NOT EXACTLY FUN BUT
 I'VE   GOT MOST OF IT OFF":SL=1
:GOTO30
285 PRINT;"I CAN'T":GOTO30
286 PRINT;"I MUST HAVE MIS-UNDER
STOOD--    PLEASE RE-ENTER COMMA
ND":GOTO30:'TRAP
287 IFD$="N" AND N=1 THEN VV=VV-
```

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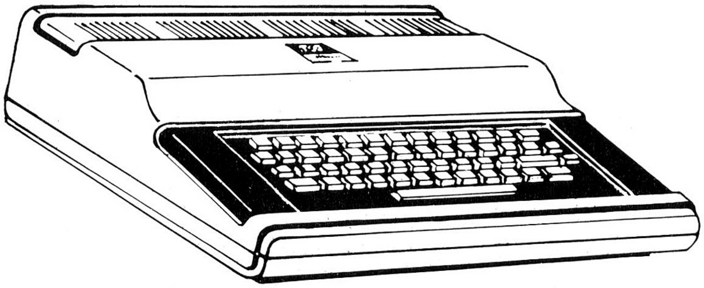

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```
1
288 IFD$="S" AND S=1 THEN VV=VV+
1
289 IFVV>5THENVV=5:GOTO303
290 IFVV<1THENVV=1:GOTO303
291 IF D$="N" AND N=0 OR D$="S"
AND S=0 THEN303
292 IFD$="E" AND E=1 THEN HV=HV+
1
293 IFD$="W" AND W=1 THEN HV=HV-
1
294 IFHV<1THENHV=1:GOTO303
295 IFHV>5THENHV=5:GOTO303
296 IF D$="E" AND E=0 OR D$="W"
AND W=0 THEN303
297 IFD$="U" AND U=1 THEN LV=LV+
1
298 IFD$="D" AND D=1 THEN LV=LV-
1
299 IFLV<1THENLV=1:GOTO303
300 IFLV>5THENLV=5:GOTO303
301 IF D$="U" AND U=0 OR D$="D"
AND D=0 THEN303
302 GOTO304
303 PRINT;"I CAN'T MOVE IN THAT
DIRECTION":PLAY"L10;AP10":GOTO30
304 GOSUB305:ON LV GOTO 326,358.
381,417,431
305 'VARIABLE SCENERIO ROUTINE
306 ON Y GOTO 307,314.316.317.31
8,319.320,321,322
307 Q6=0
308 IFQ1=0THEN RETURN
309 IFLV=1 AND Q3<4 THEN RETURN
310 Q4=RND(100-(Q1*10))
311 Q5=INT(100-(Q1*10.3))
312 IF Q4<=Q5 THEN RETURN
313 Q6=1
314 'MAZE LEVEL VAR SUBROU
315 IF LV=1 AND VV>1 AND B2=0 TH
EN PRINT;"A WEB OF STICKY STRING
-LIKE      STRANDS FELL FROM THE
CEILING    OF THE CORRIDOR. I CAN
'T MOVE    VERY WELL-THE MORE I S
TRUGGLE    AGAINST THEM-THE TIGHT
ER THEY    BIND ME.":T=0:O=0:Y=2:
GOTO447
316 IF LV=1 AND VV>1 AND B3=0THE
N PRINT;"SUDDENLY THE AIR IS RES
OUNDING  WITH CLICKING.LITERALLY
 COVERINGTHE FLOOR ARE THOUSANDS
 OF MAUVESCORPIONS.THEY ARE BLOC
KING ALL ESCAPE AND ARE SLOWLY C
LOSING IN.":T=0:O=0:Y=3:GOTO447
317 IF LV=2 AND HA=1 AND B4=0 TH
ENPRINT"THERE ARE FLAMES ALL ARO
UND ME!!A RING OF FIRE COMPLETEL
Y SUR-  ROUNDS ME!":T=0:O=0:Y=4:
GOTO447
318 IF LV=4 AND HA=1 AND B5=0 TH
ENPRINT"IRON BARS HAVE COME DOWN
 FROM   THE CEILING!! ALL THE EX
ITS ARE BLOCKED.":T=0:O=0:Y=5:GO
TO447
319 IF LV=3 AND HA=1 AND B6=0 TH
ENPRINT"SUDDENLY ALL THE EXITS A
RE       BLOCKED BY SOLID WALLS.S
PIKES    NOW EXTEND FROM THE EAST
 WALL   AND THE WEST WALL IS MOV
ING IN. HURRY,BEFORE I'M CRUSHED
!":T=0:O=0:Y=6:GOTO447
320 IF LV=4 AND HA=1 AND B7=0 TH
ENPRINT"I CAN'T MOVE MY LEGS! TH
EY SEEM TO BE FROZEN TO THE FLOO
R.":T=0:O=0:Y=7:GOTO447
321 IF B8=0 AND LV=5 AND HA=1 TH
ENPRINT"THE FLOOR IS DROPPING!":
FORX=1TO1000:NEXT:PRINT"I'M SLID
ING DOWN A CHUTE!":FORX=1TO1000:
NEXT:CLS(0):FORX=1TO500:NEXT:LV=
1:HV=3:VV=4:B8=1:Y=1:CLS:LA=0:GO
TO304
322 IFB9=0 AND LV=5 AND HA=1 THE
NPRINT"THERE IS A GOBLIN DRESSED
  IN    GUARD'S ATTIRE BLOCKING T
HE WAY.HE HAS A SWORD AT LEAST T
WICE    THE LENGTH OF MINE AND FR
OM THE LOOKS OF HIS BUILD HE ISN
'T A    PUSHOVER":T=0:O=0:Y=9
323 IF B9=0 AND LV=5 AND HA=1 TH
EN FORX=1TO1000:NEXT:PRINT:PRINT
"OH OH!":PRINT"ANOTHER ONE IS BE
HIND ME!":GOTO447
324 IFY=9 AND WJ>15-(Q1+1) THENP
RINT"THEY ARE BOTH ATTACKING-":F
ORX=1TO1500:NEXT:CLS(0):FORX=1TO
500:NEXT:CLS:END
325 HA=0:RETURN
326 'PIT AND MAZE
327 IF HV=1 AND VV=1 AND WA=1 AN
D DI=1 THEN PRINT;"I'M IN THE BO
TTOM OF THE PIT,   UNDER WATER,W
AITING FOR YOU TO  TELL ME WHAT
TO DO!!!":GOTO30
328 IF HV=1 AND VV=1 AND D1=0 AN
D WA=1 THENPRINT;"I'M TREADING W
ATER IN A PIT. IT IS ABOUT EIGHT
 FEET ACROSS IN   EACH DIRECTION
 THE WALLS ARE    COVERED WITH A
 SLIPPERY GREEN   SLIME.I WON'T
MENTION WHAT THE  AIR SMELLS LIK
E.":T=0:O=0:GOTO447
329 IF HV=1 AND VV=1 AND WA=0 AN
D D1=1 THENPRINT;"I'M AT THE BOT
TOM OF THE PIT.   LAYING IN A HE
AP ON THE FLOOR   ARE ENOUGH ASS
ORTED BONES AND   RUSTED EQUIPME
NT TO MAKE UP PER-HAPS TEN TO TW
ENTY KNIGHTS.":T=0:O=2:GOTO447
330 IF HV=1 AND VV=1 AND WA=0 AN
```

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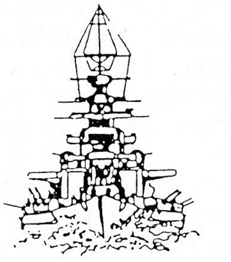

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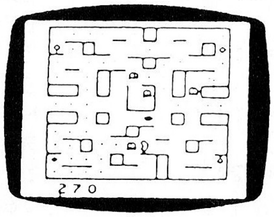

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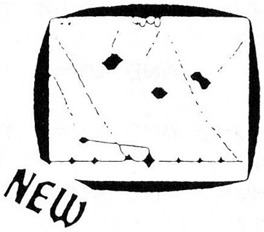

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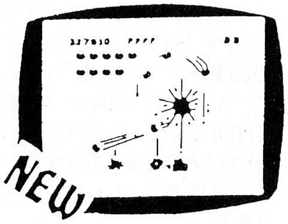

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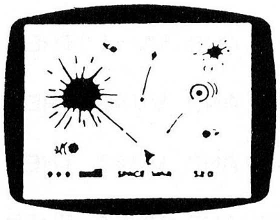

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```
D D1=0 THEN PRINT;"THE WATER HAS
 ALL GONE AND I AM STANDING ON A
 PILE OF JUNK.IT ISTOO DARK TO R
EALLY TELL WHAT IS IN THE PILE-N
OT THAT I REALLY   WANT TO KNOW
FROM THE SMELL.":T=0:O=0:GOTO447
331 IF HV=4 AND VV=1 THENPRINT"I
 AM AT THE BOTTOM OF A FLIGHT  O
F STEPS.":O=3:T=1:GOTO447
332 Q3=Q3+1
333 PRINT;"I AM IN A FEATURELESS
 MAZE OF   CORRIDORS"
334 IF HV=1 AND VV=2 THEN O=5:T=
0:GOTO447
335 IF HV=1 AND VV=3 THEN O=6:T=
0:GOTO447
336 IF HV=1 AND VV=4 THEN O=8:T=
0:GOTO447
337 IF HV=1 AND VV=5 THEN O=6:T=
0:GOTO447
338 IF HV=2 AND VV=1 THEN O=8:T=
0:GOTO447
339 IF HV=2 AND VV=2 THEN O=5:T=
0:GOTO447
340 IF HV=2 AND VV=3 THEN O=12:T
=0:GOTO447
341 IF HV=2 AND VV=4 THEN O=13:T
=0:GOTO447
342 IF HV=2 AND VV=5 THEN O=10:T
=0:GOTO447
343 IF HV=3 AND VV=1 THEN O=9:T=
0:GOTO447
344 IF HV=3 AND VV=2 THEN O=6:T=
0:GOTO447
345 IF HV=3 AND VV=3 THEN O=8:T=
0:GOTO447
346 IF HV=3 AND VV=4 THEN O=7:T=
0:GOTO447
347 IF HV=3 AND VV=5 THEN O=10:T
=0:GOTO447
348 IF HV=4 AND VV=5 THEN O=13:T
=0:GOTO447
349 IF HV=4 AND VV=4 THEN O=11:T
=0:GOTO447
350 IF HV=4 AND VV=3 THEN O=12:T
=0:GOTO447
351 IF HV=4 AND VV=2 THEN O=14:T
=0:GOTO447
352 IF HV=5 AND VV=1 THEN O=9:T=
0:GOTO447
353 IF HV=5 AND VV=2 THEN O=12:T
=0:GOTO447
354 IF HV=5 AND VV=3 THEN O=5:T=
0:GOTO447
355 IF HV=5 AND VV=4 THEN O=12:T
=0:GOTO447
356 IF HV=5 AND VV=5 THEN O=7:T=
0:GOTO447
357 PRINT;"LEVEL 1  HV=";HV;"VV=
";VV:GOTO30
358 'LEVEL 2
359 IF VV=1 AND HV=4 THENPRINT"I
 AM AT THE TOP OF A FLIGHT OF  S
TEPS":T=2:O=4:GOTO447
360 IF VV=1 AND HV=3 THENPRINT;A
$(9):O=8:T=0:HA=1:GOTO447
361 IF VV=2 AND HV=3 THENPRINT;A
$(9):O=12:T=0:HA=1:GOTO447
362 IF VV=2 AND HV=2 THENPRINT;A
$(9):T=0:O=10:HA=1:GOTO447
363 IF VV=2 AND HV=1 THENPRINT"I
'M IN A SMALL EMPTY ROOM.":HA=1:
T=0:O=3:GOTO447
364 IF VV=3 AND HV=3 THENPRINT;"
THIS MUST BE HERMAN'S WORKSHOP!
THE WALLS ARE LINED WITH SHELVES
COVERED WITH VARIOUS BOTTLES AND
VESSELS CONTAINING ALL MANNER OF
COLORED AND SHAPED SUBSTANCES.A
DESK IS SITTING IN THE CENTER.
365 IF HV=3 AND VV=3 THENPRINT"L
ITERALLY PILED WITH PAPERS.    T
HERE ARE WHAT APPEAR TO BE TWO D
RAWERS ON THE FRONT OF THE DESK"
:T=0:O=11:GOTO447
366 IF VV=3 AND HV=4 THENPRINT;A
$(9):T=0:O=10:HA=1:GOTO447
367 IF VV=3 AND HV=5 THENPRINT;A
$(9):T=0:O=9:HA=1:GOTO447
368 IF VV=4 AND HV=3 AND DR=1 TH
ENPRINT"THERE IS A LARGE DRAGON
BLOCKINGTHE HALLWAY.IT LOOKS LIK
E A NOR-MAL GREEN.ILL-TEMPERED,W
INGED,  FIRE-BREATHING DRAGON.A
PENTAGONSHAPED JEWEL IS HANGING
AROUND  IT'S NECK.":T=0:O=5:GOTO
447
369 IF VV=4 AND HV=3 THENPRINT;A
$(9):T=0:O=5:GOTO447
370 IF VV=4 AND HV=5 THENPRINT;A
$(9):T=0:O=5:HA=1:GOTO447
371 IF VV=5 AND HV=2 THENPRINT;"
I'M IN AN EMPTY ROOM.INLAID IS
A PENTAGON-SHAPED MOSIAC IN THE
FLOOR.":O=3:T=0:GOTO447
372 IF RI=0 AND VV=5 AND HV=3 AN
D DR=1 THENPRINT"I TOLD YOU IT W
AS A ILL-TEMPEREDFIRE-BREATHING
DRAGON!!           HE'S TURNING ME
 INTO A WELL-DONESNACK.":FORX=1T
O3000:NEXT:CLS(0):FORX=1TO1000:N
EXT:CLS:END
373 IF RI=1 AND VV=5 AND HV=3 AN
D DR=1 THEN374 ELSE 378
374 PRINT"I AM IN FRONT OF THE D
RAGON.THE RING MUST BE WORKING-I
T DOESN'T SEEM TO NOTICE ME.":PR
INT"VISIBLE DIRECTIONS TO MOVE A
RE- -NORTH-SOUTH":PRINT" %%%%%%%
%%%%%%%%%%%%%%%%%%%%%%":PLAY"L15
0;FP10F":INPUT"WHAT DO YOU WANT
```

```
TO DO          ";P$:
375 IF P$="N" THEN T=0:O=5:VV=4:
HV=3:GOTO304
376 IF P$="S" THENPRINT"I GOT BY
 IT! AS I WAS GOING BY IGRABBED
THE NECKLACE OFF IT'S   NECK.":D
R=0:NE=1:T=0:O=7:VV=5:HV=3:GOTO4
47 T=0:O=7:VV=5:HV=3:GOTO304
377 PRINT"IT MUST HAVE SENSED SO
METHING!! IT JUST FLASH-FRIED ME
.":FORX=1TO3000:NEXT:CLS(0):FORX
=1TO500:NEXT:CLS:END
378 IF VV=5 AND HV=3 THENPRINT;A
$(9):T=0:O=7:HA=1:GOTO447
379 IF VV=5 AND HV=5 THENPRINT"T
HE HALLWAY COMES TO A DEAD END.T
HERE IS A SMALL SACK ON THE    F
LOOR.":T=0:O=1:HA=1:GOTO447
380 PRINT;"LEVEL 2  HV=";HV;"VV=
";VV:GOTO30
381 'ENTRY LEVEL
382 IF HV=3 AND VV=5 THEN PRINT"
I AM ON THE DRAW-BRIDGE AT THE
FRONT OF THE CASTLE.    TO THE
NORTH IS THE ENTRANCE-THE DOOR
IS OPEN. TO THE EAST AND WEST IS
A PATH LEADING AROUND THE MOAT."
383 IF HV=3 AND VV=5 THEN PRINT"
TO THE SOUTH IS THE GROUP OF
TOWNS-PEOPLE WHO CAME TO WATCH.
IT WOULD BE UNTHINKABLE TO GO
BACK-THEY ARE COUNTING ON ME.":T
=0:O=13:GOTO447
384 IF HV=3 AND VV=4 THEN PRINT"
I'M IN THE GREAT ENTRY HALL.THE
VAULTED CEILING IS LOST IN THE
SHADOWS.THERE IS NO SIGN OF ANY-
ONE BEING AROUND.":T=0:O=5:GOTO4
47":T=0:HA=1:O=5:GOTO15000
385 IF HV=4 AND VV=4 THENPRINT"T
HERE IS A CIRCULAR STAIRWAY    L
EADING UPWARDS. A SMALL OPENINGI
N THE WALL IS THE ONLY SOURCE  O
F LIGHT,THE UPPER PART OF THE  S
TAIRWAY IS IN SHADOW":T=1:O=1:GO
TO447
386 IF HV=3 AND VV=3 AND WA=1 TH
EN PRINT;"THE FLOOR IS TILTING!!
! I CAN'T MOVE FAST ENOUGH TO GE
T BACK.":LA=0:FORX=1TO1500:NEXTX
:FOR X=1TO30:PRINT;"          I'M
 FALLING!":PRINT:FORY=1TO50:NEXT
Y:NEXTX:CLS(0)
387 IF HV=3 AND VV=3 AND WA=1 TH
ENFORX=1TO500:NEXTX:CLS:PRINT@23
3,"SPLASH!!??":FORX=1TO1000:NEXT
```

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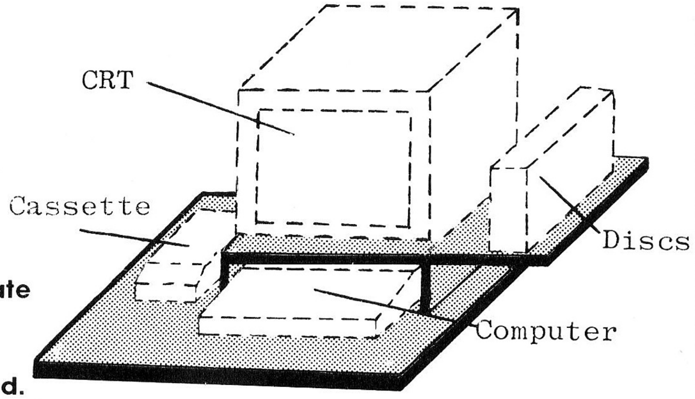

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```
X:CLS:T=0:O=0:LV=1:HV=1:VV=1:WA=
1:GOTO304
388 IF HV=3 AND VV=3 AND WA=0 TH
EN PRINT"THE FLOOR IS TILTING!!!
 I CAN'T MOVE FAST ENOUGH TO GET
 BACK.":LA=0:FORX=1TO1500:NEXTX:
FORX=1TO30:PRINT;"           I'M F
ALLING!":PRINT:FORY=1TO50:NEXTY:
NEXTX:CLS(0)
389 IF HV=3 AND VV=3 AND WA=0 TH
ENFORX=1TO500:NEXTX:CLS:PRINT@23
7,"SPLAT!!":FORX=1TO1000:NEXTX:C
LS:END
390 IF HV=3 AND VV=2 THEN PRINT"
I AM IN THE REAR ENTRANCE HALL":
T=0:O=15:HA=1:GOTO447
391 IF HV=4 AND VV=2 THEN PRINT:
A$(9):O=9:T=0:HA=1:GOTO447
392 IF HV=4 AND VV=3 THEN PRINT"
I MUST BE IN THE THRONE ROOM. AT
THE REAR OF THIS LARGE ROOM IS A
LARGE ORNATE THRONE,ON THE WALL
BEHIND IT IS A TRIANGLE-SHAPED
MIRROR. ON EITHER SIDE OF THE
THRONE ARE PLAIN CHAIRS. LARGE
TAPESTRIES DEPICTING STRANGE"
393 IF HV=4 AND VV=3 AND MI=0 TH
EN PRINT"BEINGS HANG IN TATTERS
FROM THE WALLS.":T=0:O=1:GOTO447
394 IF HV=4 AND VV=3 THENPRINT"B
EINGS HANG IN TATTERS FROM THE W
ALLS.THERE IS A DOOORWAY IN THE
SOUTH WALL.":T=0:O=5:GOTO447
395 IF HV=2 AND VV=2 THEN PRINT:
A$(9):O=8:T=0:HA=1:GOTO447
396 IF HV=2 AND VV=3 AND D2=0 TH
EN PRINT"THIS IS THE MAIN HALL.
SEVERAL  LARGE TABLES AND BENCHE
S ARE IN THE CENTER. MOUNTED ANI
MAL HEADSARE ON THE WALLS.ALONG
WITH SOMELANCES.":T=0:O=5:GOTO44
7
397 IF HV=2 AND VV=3 THEN PRINT"
THIS IS THE MAIN HALL. SEVERAL
LARGE TABLES AND BENCHES ARE IN
THE CENTER. MOUNTED ANIMAL HEADS
ARE ON THE WALLS. AT THE REAR IS
IS AN OPEN DOOR.":T=0:O=5:GOTO44
7
398 IF HV=2 AND VV=4 AND CH=0 TH
EN PRINT"THE ROOM IS FULL OF CHE
STS. ALL LOOK AS IF THEY HAVE BE
EN BROKENOPEN EXCEPT ONE. IT SIT
S ON A   SMALL PEDESTAL IN THE C
ENTER OF THE ROOM.":T=0:O=1:GOTO
447
399 IF HV=2 AND VV=4 THENPRINT"A
LL THE CHESTS IN THE ROOM ARE  O
PEN,INCLUDING THE ONE ON THE   P
EDESTAL.":T=0:O=1:GOTO447
400 IF HV=3 AND VV=1 THEN PRINT"
I AM ON A FOOT BRIDGE LEADING TO
A REAR ENTRANCE TO THE CASTLE.":
T=0:O=14:GOTO447
401 PRINT;"I AM ON A PATH OUTSID
E THE CAS- TLE WALLS.THERE IS A
SLIME COV- ERED MOAT BETWEEN THE
 CASTLE ANDTHE PATH."
402 IF HV=1 AND VV=1 THEN O=8:GO
TO447
403 IF HV=1 AND VV=2 THEN O=5:GO
TO447
404 IF HV=1 AND VV=3 THEN O=5:GO
TO447
405 IF HV=1 AND VV=4 THEN O=5:GO
TO447
406 IF HV=1 AND VV=5 THEN O=6:GO
TO447
407 IF HV=2 AND VV=5 THEN O=10:G
OTO447
408 IF HV=4 AND VV=5 THEN O=10:G
OTO447
409 IF HV=5 AND VV=5 THEN O=7:GO
TO447
410 IF HV=5 AND VV=4 THEN O=5:GO
TO447
411 IF HV=5 AND VV=3 THEN O=5:GO
TO447
412 IF HV=5 AND VV=2 THEN O=5:GO
TO447
413 IF HV=5 AND VV=1 THEN O=9:GO
TO447
414 IF HV=4 AND VV=1 THEN O=10:G
OTO447
415 IF HV=2 AND VV=1 THEN O=10:G
OTO447
416 PRINT;"LEVEL 3  HV=";HV;"VV=
";VV:PRINT;"############ERROR##
##########":GOTO30
417 'LEVEL 4
418 IF VV=2 AND HV=1 THENPRINT"I
'M IN AN EMPTY ROOM.INLAID IS  A
 PENTAGON-SHAPED MOSIAC IN THE F
LOOR.":T=0:O=2:GOTO447
419 IF VV=3 AND HV=1 THENPRINT:A
$(9):T=0:O=11:HA=1:GOTO447
420 IF VV=3 AND HV=2 THENPRINT:A
$(9):O=10:T=0:HA=1:GOTO447
421 IF VV=3 AND HV=3 AND ST=1 TH
ENPRINT:A$(9):PRINT"THERE IS A N
ICHE WITH A STATUE  OF A GARGOYL
E IN THE NORTH WALL.":T=0:O=14:H
A=1:GOTO447
422 IF VV=3 AND HV=3 THENPRINT:A
$(9):PRINT"THERE IS A NICHE IN T
HE NORTH   WALL.":T=0:O=14:HA=1:
GOTO447
423 IF VV=3 AND HV=4 AND D3=1 TH
ENPRINT:A$(9):PRINT;"THERE IS A
MASSIVE DOOR IN THE  EAST WALL."
```

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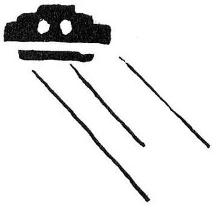

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```
:T=0:O=4:GOTO447
424 IF VV=3 AND HV=4 THENPRINT;A
$(9):T=0:O=10:GOTO447
425 IF VV=3 AND HV=5 THENPRINT"T
HIS TRULY MUST BE BLANDOR'S OWNR
OOM.THE WALLS ARE COVERED WITH R
ICH TAPESTRIES,THE FLOOR IS OF W
OOD-HIGHLY POLISHED,AND THE    F
URNITURE IS GILTED IN GOLD AND C
OVERED WITH VARIOUS JEWELS.":T=0
:O=4:GOTO447
426 IF TS=0 AND VV=4 AND HV=1 TH
ENPRINT"I'M AT THE BOTTOM OF A F
LIGHT OFSTAIRS.WELL.ALMOST.THERE
 ARE     ONLY FIVE STEPS AT THE B
OTTOM,   THEN AN EMPTY SECTION OF
 ABOUT   THIRTY FEET.AND FIVE STE
PS AT    THE TOP NEAR THE CEILING
.":T=0:O=1:GOTO447
427 IF VV=4 AND HV=1 AND TS=1 TH
ENPRINT"I AM AT THE BOTTOM OF A
FLIGHT  OF STEPS.":T=1:O=1:GOTO4
47
428 IF VV=4 AND HV=3 THENPRINT;A
$(9):O=6:T=0:HA=1:GOTO447
429 IF VV=4 AND HV=4 THENPRINT"I
 AM AT THE HEAD OF A FLIGHT OF S
TEPS":T=2:O=4:GOTO447
430 PRINT;"LEVEL 4  HV=";HV;"VV=
";VV:GOTO30
431 'LEVEL 5
432 IF VV=4 AND HV=1 THENPRINT"I
 AM AT THE TOP OF A FLIGHT OF  S
TEPS":T=2:O=2:GOTO447
433 IF VV=5 AND HV=1 THENPRINT;A
$(9):T=0:O=6:HA=1:GOTO447
434 IF VV=5 AND HV=2 THENPRINT;A
$(9):T=0:O=10:HA=1:GOTO447
435 IF VV=5 AND HV=3 THENPRINT;A
$(9):T=0:O=7:HA=1:GOTO447
436 IF VV=4 AND HV=3 THENPRINTA$
(9):T=0:O=5:HA=1:GOTO447
437 IF VV=3 AND HV=3 THENPRINT;A
$(9):T=0:O=8:HA=1:GOTO447
438 IF VV=3 AND HV=4 THENPRINT;A
$(9):T=0:O=10:HA=1:GOTO447
439 IF VV=3 AND HV=5 THENPRINT;A
$(9):T=0:O=7:HA=1:GOTO447
440 IF VV=2 AND HV=5 THENPRINT;A
$(9):T=0:O=5:HA=1:GOTO447
441 IF VV=1 AND HV=5 THENPRINT;A
$(9):T=0:O=9:HA=1:GOTO447
442 IF VV=1 AND HV=4 THENPRINT;A
$(9):T=0:O=10:HA=1:GOTO447
443 IF VV=1 AND HV=3 AND D4=1 TH
ENPRINT;A$(9):PRINT"IN THE SOUTH
 WALL IS ONE BLACK- COLORED BLOC
K.":HA=1:T=0:O=3:GOTO447
444 IF VV=1 AND HV=3 THENPRINT;A
$(9):T=0:O=8:HA=1:GOTO447
445 IF VV=2 AND HV=3 THENPRINT"I
T IS SOME SORT OF SHRINE.THERE A
RE SEVERAL LARGE WINDOWS IN THER
OOM-THE DAYLIGHT IS A WELCOME  C
HANGE FROM THE DARKNESS OF THE C
ASTLE BELOW.AN ALTAR IS LOCATEDI
N THE CENTER OF THE ROOM.":T=0:O
=1:GOTO447
446 PRINT;"LEVEL 5  HV=";HV;"VV=
";VV:GOTO30
447 D=0:U=0:N=0:S=0:E=0:W=0
448 PRINT;A$(1)
449 IF T=0 AND O=0 THENPRINT;A$(
8):GOTO30
450 IF T=1 THEN PRINT;A$(2):U=1:
GOTO453
451 IF T=2 THEN PRINT;A$(3):D=1:
GOTO453
452 IF T=3 THEN PRINT;A$(2);A$(3
):U=1:D=1
453 ON O GOTO454,455,456,457,458
,459,460,461,462,463,464,465,466
,467,468,469
454 PRINT;A$(4):N=1:GOTO30
455 PRINT;A$(5):S=1:GOTO30
456 PRINT;A$(6):E=1:GOTO30
```

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```
457 PRINT;A$(7):W=1:GOTO30
458 PRINT;A$(4);A$(5):N=1:S=1:GO
TO30
459 PRINT;A$(4);A$(6):N=1:E=1:GO
TO30
460 PRINT;A$(4);A$(7):N=1:W=1:GO
TO30
461 PRINT;A$(5);A$(6):S=1:E=1:GO
TO30
462 PRINT;A$(5);A$(7):S=1:W=1:GO
TO30
463 PRINT;A$(6);A$(7):W=1:E=1:GO
TO30
464 PRINT;A$(4);A$(5);A$(6):N=1:
S=1:E=1:GOTO30
465 PRINT;A$(4);A$(5);A$(7):N=1:
S=1:W=1:GOTO30
466 PRINT;A$(4);A$(6);A$(7):N=1:
E=1:W=1:GOTO30
467 PRINT;A$(5);A$(6);A$(7):S=1:
E=1:W=1:GOTO30
468 PRINT;A$(4);A$(5);A$(6);A$(7
):N=1:S=1:E=1:W=1:GOTO30
469 GOTO30
470 'A$(1-10) DATA LINES
```

```
471 DATA VISIBLE DIRECTIONS TO M
OVE ARE-.-UP.-DOWN.-NORTH.-SOUTH
.-EAST.-WEST.---NONE---.I AM IN
A HALLWAY. THE WALLS ANDFLOOR AR
E SOLID STONE..10
472 DATA LOOK.SLAY.JUMP.LIST.SAY
.RUB.TURN.LIFT.CUT.STAB
473 DATA CLIM.GET.UNLO.STAN.PULL
.PUSH.DROP.CARR.BRIB.BREA
474 DATA HIT.DIG.BURN.OPEN.PUT.S
MEL.SPRI.KICK.DIVE.WIPE
475 'C$(1-40) DATA LINES
476 DATA WEB.STRA.SWOR.DAGG.RUBY
.RING.SCOR.CHAI.SLIM.WALL
477 DATA OUTL.FLIN.NECK.STAI.DUS
T.DESK.PAPE.DRAW.BOTT.VESS
478 DATA PENT.STAT.NICH.KEY.DOOR
.FLOO.PLAN.OCTA.TRIA.MIRR
479 DATA BLOC.CHES.HEXA.SPID.LAN
C,HOLE,ALTA.SPIK.BARS.SACK
```

Colors Galore In PMODE4

16K
ECB

Here is an interesting PMODE4 item sent us by R.W. Odlin from Sedro-Woolley, Washington. This program, which he calls *Tartan*, will generate stripes, plaids and more colors than you may have ever seen emerge from CoCo's amazing interior.

Just *CLOAD, RUN*, and when you want to vary the program, hit *DEL 35*. Things get even more interesting—and those new colors weave into view—when you *DEL 50*. And, of course, you can strike the shift and @ keys to stop and inspect these emerging patterns whenever you want.

It seems there should be some practical application for this one in the hands of a carpet or wallpaper designer. Any ideas?

```
10 CLS:PMODE4,1:SCREEN1,1:PCLS
20 POKE65495,0:DIMX(255),Y(191),
A,B
30 B=RND(8)+1:C=RND(2):COLORC
35 GOTO60
40 FORX=0 TO255STEPB:LINE(X,0)-(
X,191),PSET:NEXT
50 RUN20
60 FORY=0 TO191STEPB:LINE(0,Y)-(
255,Y).PSET:NEXT:RUN20
```

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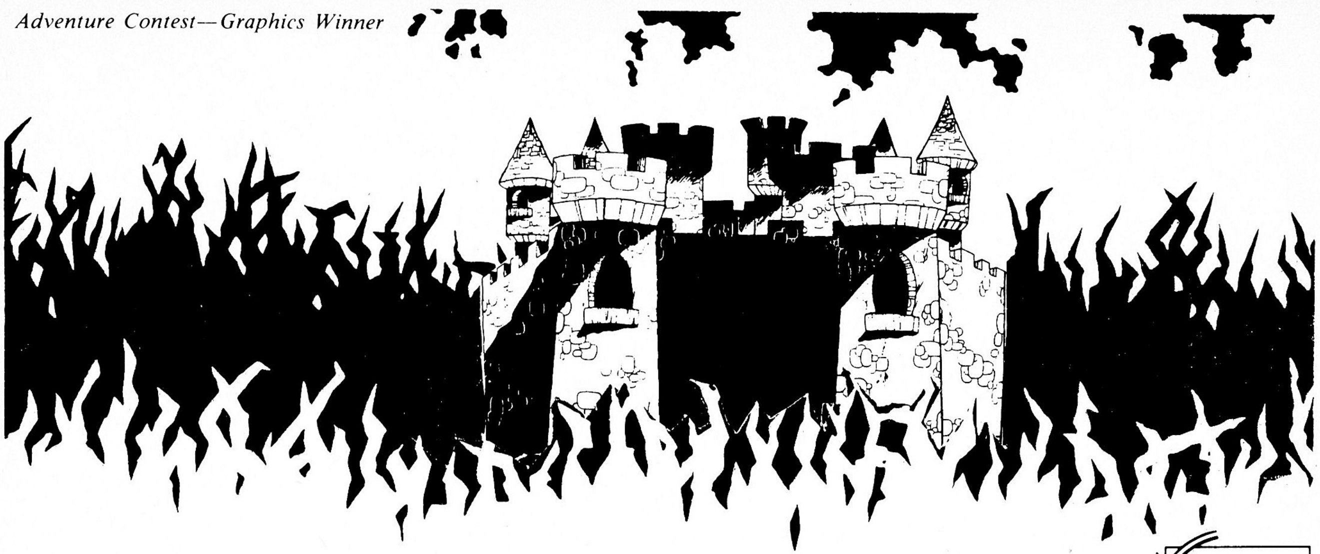


Dungeon	
1107	End

Playing the Great *Dungeon Adventure*

By Gregory Ricketts

32K ECB

DAvdenture	
44F0	End
39E0	1990
2BB1	1500
1CB7	1000
0EE6	500

Entering the Dungeon

If you're ready to engage these dire grounds, to face a motley mob of menacing monsters and peregrinate the perilous pathways of this labyrinth laden with liability, please *CLOAD* and *ENTER*.

First, load the dungeon-making program entitled *Dungeon*. If instead, you wish to continue an adventure already started, you need to load the program entitled *Adventur*, and then follow the directions for loading your old party from tape. Let's pretend we're starting an adventure. First load *Dungeon*, then answer "No" to the first question; you need a party of adventurers, not just a dungeon. After you have completed making your adventuring party, make sure the "play" key on the recorder is down, because after the dungeon is generated the next program *Adventur* will be automatically loaded.

Once *Adventur* is loaded, you should answer the question, "Are you starting a new adventure?" with a "Yes." If you were to answer "No," you would be prompted to load in your old party. Next, you are instructed in how to set up your party members in the order they will first appear in any encounter.

The flashing cursor is controlled by the arrow keys and the specified party member is placed with the "P" key. A status report can be taken during this routine.

Movement through the dungeon is pretty self-explanatory, the arrow keys are used to move your party. I have included in this phase a status report, and, during this phase, the dungeon and your adventuring party can be saved to tape. I also have included wandering monsters, so that even dungeon areas that should be cleared, signified by the X's can be encounter areas, and getting back to the exit might be full of peril.

During the fight sequence, there are still four things each party member may do. Movement—which is again accomplished by the arrow keys; Fighting—placing the grid mentally over the attacking party member and pressing the appropriate key for the monsters (I don't think anyone could understand that explanation without the game in front of them); Taking a position—which can give you extra movement, attack levels, damage factors, defense points, and recovery of lost body points; Checking status.

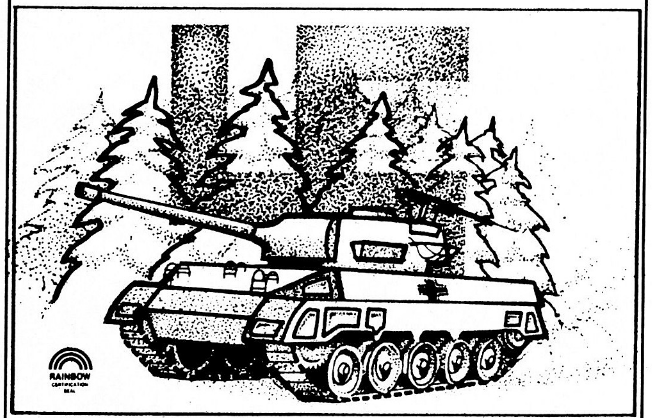
Whenever you return from town, you must go through the adventurer set-up phase.

My best hint: If you have a certain character you don't want to die, namely yourself, have him attack from a diagonal while another party member attacks straight on. The monster will attack the other party member first.

Good luck!

Listing 1—Dungeon

```
10 PCLEAR4:CLEAR100,31000:DIMDP(
64),DU(30,30),A(400),B(400):GOSU
B560
20 CLS:PRINT"HERE ARE SOME TERMS
```



Across The Rubicon

Call it the Huertgen Forrest, dubbed the "death trap" by G. I.'s, where the Germans bore-sighted every hill and valley, and tree-bursting shells made diving for cover more deadly than standing tall. Too large to outflank, the Huertgen blocked the approaches to Cologne and the Ruhr; it had to be taken. But Hitler had sworn that no invader would ever step foot on German soil, and too many pledges had already been broken. And there was another reason, known only to Hitler and a handful of trusted staff. Delaying the Americans in the Huertgen would provide time to assemble and unleash his attack in the Ardennes.

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```
 AND            THEIR MEANINGS:":PR
INT:PRINT"body points-AMOUNT OF
DAMAGE A  CHARACTER CAN TAKE BEF
ORE DEATH.";:PRINT"defense point
s-THE ABILITY TO   WITHSTAND ATT
ACK WITHOUT TAKING DAMAGE(ARMOR
OR DEXTERITY).
30 PRINT"experience level-AFFECT
S PLAYERSABILITY TO ATTACK EFFEC
TIVELY.":PRINT"damage factor-AMO
UNT OF DAMAGE  DONE TO CREATURES
 THE CHARACTER ATTACKED.":PRINT@
490,"<enter> TO CONTINUE";
40 GOSUB540
50 CLS:INPUT"DO YOU WANT JUST A
NEW DUNGEON   (Y/N)";DE$:IFDE$<>
"Y"THEN70ELSEPRINT"PLACE TAPE WI
TH ADVENTURES IN   THE RECORDER
AND PRESS PLAY":INPUT"NAME OF LA
ST ADVENTURE";L$:IFLEN(L$)>8THEN
L$=LEFT$(L$,8)
60 CLOADML$:GOTO180
70 CLS:PRINT"YOU MAY CHOOSE HOW
MANY POINTS  YOUR MAIN CHARACTER
 WILL HAVE   IN THESE AREAS. EXC
EPT FOR THE  EXPERIENCE LEVEL WH
ICH STARTS   AT 4.  YOU HAVE 35
POINTS TO USEAND NONE OF THE LEV
ELS CAN BE   BELOW 5.":P=35
80 PRINT@288,"BODY POINTS":PRINT
@320,"DAMAGE FACTOR":PRINT@352,"
DEFENSE POINTS"
90 GOSUB550:PRINT@304,"";:INPUTB
P(0):P=P-BP(0):GOSUB550:PRINT@33
6,"";:INPUTDF(0):P=P-DF(0):GOSUB
550:PRINT@368,"";:INPUTP(0):P=P-
P(0):GOSUB550:PRINT@384,"";:IFP<
>0THEN70
100 IFBP(0)<5ORDF(0)<5ORP(0)<5TH
EN70
110 INPUT"WHAT NAME FOR YOUR CHA
RACTER     (UNDER 9 LETTERS)";NM$
(0)
120 CLS:INPUT"DO YOU WANT <H>ENC
HMEN              OR <M>ERCENARIES";
D$:IFD$="H"THEN140ELSEIFD$<>"M"T
HEN120
130 CLS:R=RND(4)+1:PRINT"YOU HAV
E";R;"MERCENARIES.":FORL=1TO R:B
P(L)=8:DF(L)=6:P(L)=6:NM$(L)="ME
RCENARY":NEXT:FORL=1TO750:NEXT:G
OTO180
140 R=RND(3):FORL=1TO R
150 BP(L)=RND(9)+3:DF(L)=RND(7)+
2:P(L)=RND(7)+2:NEXTL
160 CLS:PRINT"henchmen names(UND
ER 9 LETTERS)":PRINT"BODY PO. DA
MAGE FAC. DEFENSE PO.";:FORL=1TO
 R
170 PRINT"    ";BP(L);"        ";DF
```

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It also has a unique feature which can save you much time. it automatically converts all model I and III tokens. This allows you to run most model I and III basic programs just as they are downloaded on your color Computer. This also allows you to send basic programs to any model I or III owner who has a copy of DFT. (DFT is very popular with the Model I and III). You must have modem.

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```
(L);"          ";P(L):INPUTNM$(L):N
EXT
180 CLS0:FORL=64TO70:PRINT@L,CHR
$(128);"dungeon";:NEXT:FORL=224T
O234:PRINT@L,CHR$(128);"generati
on";:NEXTL:FORL=384TO402:PRINT@L
,CHR$(128);"period";:NEXTL:POKE6
5494,0
190 PLAY"V20O4T2L16DP16DP128DP12
8DP128L4.FP16L16FP128FP128L8FP64
L16DP128DP128L8DP64CP64O3L4.B-P1
28O4L8CP64DP64E-P64FP64L16FP128F
P128L1B-P128L8O3B-P64O4CP64L4.DP
128L16DP128DP128L8FP64DP64L4.CP6
4L16CP128CP128L8E-P64CP64O3B-P64
O4L16DP128DP128L8DP64L16F
200 PLAY"FP128L8FP48FP48L1F":POK
E65495,0
210 FORL=0TO30:FORK=0TO30:DU(L,K
)=0:NEXTK,L
220 FORL=1TO64:READDP:DP(L)=DP:N
EXTL:DATA1,2,3,4,6,8,10,13,16,18
,20,22,23,24,25,27,1,3,4,5,7,10,
11,14,17,20,21,22,24,25,26,29,1,
2,4,5,6,9,11,15,16,19,21,22,23,2
5,26,30,1,2,3,5,7,8,9,12,17,18,1
9,22,23,24,26,28:DU(15,15)=1:DP=
1:X=15:Y=15
230 FORL=1TO64:IFDP(L)<>DP THEN2
70
240 XX=0:YY=0:IFL<17THENAD=32:YY
=-1ELSEIFL>16ANDL<33THENAD=48:XX
=1ELSEIFL>32ANDL<49THENAD=0:YY=1
ELSEIFL>48THENAD=16:XX=-1
250 IFX+XX<0ORX+XX>30ORY+YY<0ORY
+YY>30THEN270
260 IFDU(X+XX,Y+YY)=0THEN290
270 NEXT
280 X=A(SS):Y=B(SS):DP=DU(X,Y):S
S=SS+1:PRINT@27,401-SS;:IFST<SS
ANDST<50THENRESTORE:GOTO210ELSEI
FST<SS THEN380ELSE230
290 D1=DP(RND(16)+AD)
300 IFX+XX=0ANDD1<27THEN290ELSEI
FX+XX=30ANDD1<27THEN290ELSEIFY+Y
Y=0ANDD1<27THEN290ELSEIFY+YY=30A
NDD1<27THEN290
310 DU(X+XX,Y+YY)=D1:FORL=1TO64:
IFDP(L)=DP THENP=P+1
320 NEXT
330 IFP>1THENA(ST)=X:B(ST)=Y:ST=
ST+1:PRINT@0,400-ST;
340 IFST>399THEN380
350 P=0:FORL=1TO64:IFDP(L)=DP TH
ENP=P+1
360 NEXT
370 IFP>1THENDP=D1:X=X+XX:Y=Y+YY
:GOTO230ELSEGOTO230
380 IFSS=401THEN450ELSEX=A(SS):Y
=B(SS):DP=DU(X,Y):SS=SS+1
```

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```
390 FORL=1TO64:IFDP(L)<>DP THEN4
30
400 XX=0:YY=0:IFL<17THEND1=30:YY
=-1ELSEIFL>16ANDL<33THEND1=28:XX
=1ELSEIFL>32ANDL<49THEND1=27:YY=
1ELSEIFL>48THEND1=29:XX=-1
410 IFDU(X+XX,Y+YY)<>0THEN430
420 DU(X+XX,Y+YY)=D1
430 NEXTL
440 IFSS=401THEN450ELSEX=A(SS):Y
=B(SS):DP=DU(X,Y):SS=SS+1:PRINT@
27,401-SS;:GOTO390
450 CLS0:FORL=224TO234:PRINT@L,C
HR$(128);"completed";:NEXT
460 J=31000:FORL=0TO30:FORK=0TO3
0:POKEJ,DU(L,K):J=J+1:NEXTK,L:PO
KE31962,15:POKE31963,15:IFDE$="Y
"THEN520
470 J=32000:L=0
480 POKEJ,BP(L):POKEJ+1,DF(L):PO
KEJ+2,P(L)
490 IFL=0THENPOKEJ+3,&H27:POKEJ+
4,&H10 ELSEPOKEJ+3,&H0C:POKEJ+4,
&HD0
500 J=J+5:L=L+1:IFNM$(L)<>""THEN
480ELSEPOKEJ,42:J=J+1:L=0
510 FORK=1TO LEN(NM$(L)):POKEJ,A
SC(MID$(NM$(L),K,1)):J=J+1:NEXTK
:L=L+1:POKEJ,42:J=J+1:IFNM$(L)<>
""THEN510ELSEPOKEJ,255
520 POKE65494,0:CLOAD
530 END
540 K$=INKEY$:R=RND(0):IFK$=""TH
EN540ELSERETURN
550 PRINT@224,"points left";P;:R
ETURN
560 POKE65495,0:K=1:J=1:G$="by"+
CHR$(128)+"greg"+CHR$(128)+"rick
etts":L$="dungeon"+CHR$(128)+"ad
venture":CLS0:FORL=0TO509:PRINT@
L,CHR$(128);CHR$(207);:IFL>197AN
DL<215THENGOSUB590ELSEIFL>461AND
L<481THENGOSUB600
570 NEXT
580 POKE65494,0:PRINT@510,CHR$(1
28);:GOTO610
590 PRINT@L,MID$(L$,J,1);:J=J+1:
RETURN
600 PRINT@L,MID$(G$,K,1);:K=K+1:
RETURN
610 PLAY"O4T5L4DP128L8D+P128L4.E
P128L8E-P128L4DP128L8C+P128L4DP1
28L8D+P128L2EP128L8E-P128L4DP128
L8C+P128L4DP128L8D+P128L4EP128L8
E-P128L4DP128L8C+P128L4CP128L8O3
BP128AP4O4DP2DP128DP128C+P128DP1
28EP128P4L4.EL8F+P4L4.F+L8AP4L2G
P128L8GP128GP128F+P128ED"
620 PLAY"P8D+P128EP8E-P128L4DP12
8L8DP128DP128DP128DP8D+P128
EP8E-P128L4DP128L8DP128DP128C+P1
28DP128EP4L4.EL8F+P4L4.F+L8AP4L4
.GL4GP128L8GP128GP128F+P128GP128
L4F+P128L8F+P128F+P128GP128G+P12
8AP128O3AP128AP128BP128O4C+P128D
P8C+P128DP8C+P128L3D"
630 FORL=1TO10:CLS7:CLS8:NEXT:RE
TURN
```

Listing 2—Adventur

```
10 CLS:PCLEAR4:CLEAR1700,31000:D
IML$(25),MO$(19),MC(1),MO(1),HM(
1),MR(1),CY(1),CA(10,2),CP(11,3)
,MP(51,2),PO(11,3),N$(11),B(11),
BP(11),DF(11),DP(11),EX(11),AL(1
1):L=RND(-TIMER)
20 DP$(1)="BD18BL5U3HLG2LHLH3U2H
EU2HL2BU10R3EU3HUE2R2ERE2REUBR10
D2FRERF2RF2D5FDR3BD10L2G2DFDG2L4
GL2GD4"
30 DP$(2)="BD18BL5U2HLH3LH2U2HUH
L3BU10R2E4UER2ER2FRFERER5F2R2ERF
RFDFDFR2BD10L2GLG2DGDG2LG3D2BU36
DGL8HU"
40 DP$(3)="BD18BL5U3H2LH5U3HUEU7
HU2EUE2UER4EU3BR10D3F2DFRFRFDFD2
FD5GDFDGD2GDGDG2L3GD3BR13BU13LHU
8ERBL36RFD8GL"
50 DP$(4)="BD18BL5U2HL2HL2HLHUHU
4HL2BU10R2E3RERE2R2ERERER2FR2FR2
F2DF3DFD2F2D2GD6GLG4LG2D2BR13BU1
3LHUEU3HU2ERBU13BL13GHL2GHG2LHU"
60 DP$(5)="BD18BL5U3HLH2LHUHU2HU
```

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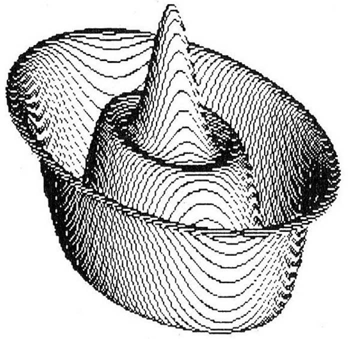

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```
2HUEU2EUE2UE7FER3FR3FR2F3DFD4FD2
GD2FDGD2GDG3LGL2D3BR13BU13LHU3EU
HUE2BU13BL13GLGLHL2GLHUBL13BD13F
2GD3GD3"
70 DP$(6)="BD18BL5U2EUHU2HU3H2L2
GL3HL3BU10R3FER2EFRE3U3EU2HU3BR1
0D4GD2F2D3F2R2E2RFR4BD10L2HL2GLG
L3HLGD2GDFD4FD2"
80 DP$(7)="BD18BL5U5EU2HU3HL3GL3
H2LGLBU10R3ER7FR7ER2FR3FR2ER6BD1
0L6HL3GL2GDFD10BU36DG2LHL3HGHU"
90 DP$(8)="BD18BL5U4EU5HUHU6EU6H
U2EU6BR10D6FD7GDFD2GD6FD3GD5BR13
BU13LHUHU2EU2E2BL36RFGDFG2FDFGL"
100 DP$(9)="BD18BL5U5EUHU2H4L4GL
4BU10R7FR3E2R5FR2F3D2FD3GD9GD3BR
13BU13LHUEUHE2U3BU13BL13D2GL3GL2
HLHU2"
```

```
110 DP$(10)="BD18BL5U5EU2HU5HU7E
2R4FRERFD8FD6GD7BR13BU13HU2EHU2H
E2BU13BL13GHL5GLHBL13BD13F2D2GDF
D2GL"
120 INPUT"ARE YOU STARTING A NEW
 ADVENTURE (Y/N)";L$:IFL$="Y"THE
N130ELSECLS:PRINT"PLACE TAPE WIT
H ADVENTURES      IN THE RECORDE
R PRESS PLAY":INPUT"WHAT WAS THE
 NAME GIVEN TO YOUR LAST ADVENTU
RE";L$:IFLEN(L$)>8THENCLOADMLEFT
$(L$,8):CLSELSECLOADML$
130 J=32000:L=1
140 BP(L)=PEEK(J):DF(L)=PEEK(J+1
):DP(L)=PEEK(J+2):EX(L)=(PEEK(J+
3)*256)+PEEK(J+4):AL(L)=INT(EX(L
)/3280+1):J=J+5:L=L+1:IFPEEK(J)<
>42THEN140ELSEJ=J+1:L=1
150 N$(L)=N$(L)+CHR$(PEEK(J)):J=
J+1:IFPEEK(J)<>42THEN150ELSEIFPE
EK(J+1)=0THENC9=L:J=J+2:L=1:GOTO
170ELSEIFPEEK(J+1)=255THENC9=L:J
=J+2:L=1ELSEJ=J+1:L=L+1:GOTO150
160 B(L)=BP(L):L=L+1:IFN$(L)<>""
THEN160ELSE190
170 FORL=1TO C9:B(L)=PEEK(J):J=J
+1:NEXT:J=J+1:CR=(PEEK(J)*256)+P
EEK(J+1):J=J+3:FORL=0TO10:CA(L,0
)=PEEK(J):CA(L,1)=PEEK(J+1):CA(L
,2)=PEEK(J+2):J=J+3:NEXT:IFPEEK(
J)=255THEN190ELSEL=1
180 PO$(L)=PO$(L)+CHR$(PEEK(J)):
J=J+1:IFPEEK(J+1)=255THEN190ELSE
IFPEEK(J)=42THENJ=J+1:L=L+1:GOTO
180ELSE180
190 POKE65495,0:FORL=0TO25:READL
$:L$(L)=L$:NEXT:FORL=&H7F01 TO &
H7FFF:READL$:POKEL,VAL("&H"+L$):
NEXT:FORL=0TO19:READL$:MO$(L)=L$
:NEXT:PMODE3:PCLS2:PMODE4:GET(0,
0)-(7,7),HM,G:PMODE3:PCLS3:PMODE
4:GET(0,0)-(7,7),MC,G:PMODE4
200 PCLS0:GET(0,0)-(7,7),MR,G:PO
KE65494,0:GOSUB810
210 XP=PEEK(31962):YP=PEEK(31963
):IFPEEK(31480)=1THENPOKE31480,3
1
220 PMODE4:COLOR0,1:PCLS:SCREEN1
,0:POKE65495,0
230 X=18:Y=18:PCLS:FORJ=YP-2TO Y
P+2:FORK=XP-2TO XP+2:DP=PEEK(310
00+J*31+K):IFDP>30THENDP=DP-30:G
OSUB2090
240 GOSUB410:DRAW"BM"+STR$(X)+",
"+STR$(Y)+"A"+STR$(A)+DP$(L):X=X
+37:NEXTK:X=18:Y=Y+37:NEXTJ
250 L$="USE":DRAW"BM192,30":J=3:
GOSUB2070:L$="ARROW":DRAW"BM200,
40":J=5:GOSUB2070:L$="KEYS":J=4:
DRAW"BM224,50":GOSUB2070:L$="CAS
SETTE":J=8:DRAW"BM192,170":GOSUB
2070:L$="STATUS":J=6:DRAW"BM192,
180":GOSUB2070
```

```
260 POKE65495,0:PUT(88,88)-(95,9
5),MC,PSET:FORL=1TO100:NEXT:LINE
(88,88)-(95,95),PRESET.BF:K$=INK
EY$
270 LINE(88,88)-(95,95),PRESET,B
F:IFPEEK(342)=247GOSUB920:K$=CHR
$(10)ELSEIFPEEK(341)=247GOSUB960
:K$="^"ELSEIFPEEK(344)=247GOSUB1
000:K$=CHR$(9)ELSEIFPEEK(343)=24
7GOSUB1030:K$=CHR$(8)ELSEIFK$="S
"GOSUB2130:GOTO260ELSEIFK$="C"TH
EN2180ELSE260
280 POKE65494,0
290 IFPEEK(31000+YP*31+XP)>30AND
RND(100)=69GOSUB2160:GOTO230
```

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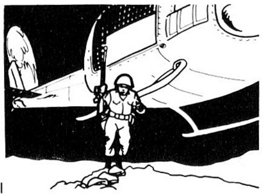

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Can you change history? You command the South Vietnam army; the computer controls the Viet Cong (VC) and North Vietnamese Army. Can you win the hearts and minds of the people, and destroy the VC units in your province? Challenging operational level combat game with hi res graphics.

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By Lance Micklus from Adventure International
The beautiful Princess Leya has been captured by the evil General Doom. Can you save her, and the Royal Treasury, from Doom and his army? Extended BASIC required.

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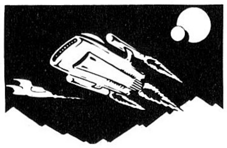

Avenger

From Cornsoft
Pest control in space is ***not easy!*** Your Pesticraft is armed with laser and pesticide bombs to vaporize the almost-endless wave of pests. Watch for the AVENGER that tries to stop you. And the birds—filled with attacking droids. Get an extra Pesticraft for each 10,000 points. Requires 2 joysticks.

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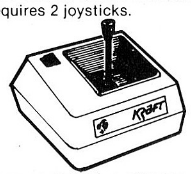

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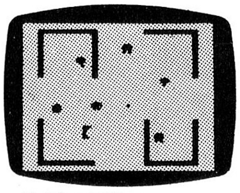

Robot Battle

From Spectral Associates
Can you dodge the never-ending horde of robots while avoiding the fatal touch of the Android? Realistic voices and 16 skill levels provide a tremendous arcade type challenge. Does not require Extended BASIC; joysticks.

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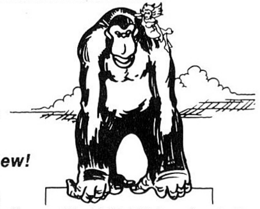

Monkey Kong *New!*

From Med Systems
Exciting arcade action with delightful animated graphics. You'll need all your speed, skill and manual dexterity for this one! With increasing levels of difficulty, so you won't get bored. For 1 or 2 players, or 2-player split control.

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From Mark Data Products
Hostile robots await you in a series of dangerous rooms. As you fire your laser gun to destroy the robots, be sure not to touch the walls or any objects you find—they are all ***electrified!*** Don't relax for a moment. . . the Indestructible Menace is lurking somewhere, ready to demolish everything in his path . . . and he cannot be destroyed. Fast-paced 1 or 2 player game with great colors and sound. Requires joystick for each player.

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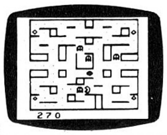

Ghost Gobbler

From Spectral Associates
In this new and exciting version of the popular arcade game, use your joysticks to move your Ghost Gobbler through the maze, eating dots and power pills to score points. 8 bonus shapes, super sound, and 16 skill levels. Extended BASIC not required; joysticks.

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By Ken Kalish from Med Systems.
You are the Phantom Slayer, assigned to enter the deadly Catacombs and destroy the mutant Phantoms. You're armed with a laser pistol and proximity detector, but be careful—the Phantoms' touch is ***fatal!*** Real-time machine language game with hi-res 3-D graphics and sound. Multiple skill levels; extended BASIC not required.

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```
300 IFXP=15AND YP=15THENL$="EXIT
":J=4:DRAW"BM200,100":GOSUB2070:
FORL=1TO5:SOUND240,2:SOUND150,2:
NEXT:LINE(200,93)-(230,140),PRES
ET,BF ELSE320
310 K$=INKEY$:IFK$=""THEN310ELSE
IFK$="E"THEN1930ELSE270
320 NU=31000+YP*31+XP:IFPEEK(NU)
<31THENPOKENU,PEEK(NU)+30ELSE260
330 FORL=0TO10:IFCA(L,0)=XP ANDC
A(L,1)=YP THENR=CA(L,2):GOTO360E
LSENEXT
340 IFPEEK(NU)-30>15THEN260ELSEI
FRND(6)>2THEN260
350 R=RND(20)-1
360 PLAY"V30O1L255T255":FORL=1TO
30:PLAY"CDV-":NEXT:L$="YOU SPOT"
:J=8:DRAW"BM190,100":GOSUB2070:L
=LEN(MO$(R)):L$=RIGHT$(MO$(R),L-
14):J=L-14:DRAW"BM180,110":GOSUB
2070:L$="FIGHT":J=5:DRAW"BM194,1
40":GOSUB2070
370 L$="OR RUN":J=6:DRAW"BM192,1
50":GOSUB2070
380 L$=INKEY$:IFL$=""THEN380ELSE
IFL$="R"THEN1060ELSEIFL$="F"GOSU
B1120ELSE380
390 GOTO220
400 GOTO400
410 IFDP=0ORDP>30THENL=0ELSEON D
P GOSUB430,440,450,460,470,480,4
90,500,510,520,530,540,550,560,5
70,580,590,600,610,620,630,640,6
50,660,670,680,690,700,710,720
420 RETURN
430 L=1:RETURN
440 L=2:A=2:RETURN
450 L=2:A=1:RETURN
460 L=2:A=0:RETURN
470 L=2:A=3:RETURN
480 L=3:A=1:RETURN
490 L=3:A=0:RETURN
500 L=4:A=1:RETURN
510 L=4:A=2:RETURN
520 L=4:A=0:RETURN
530 L=4:A=3:RETURN
540 L=5:A=2:RETURN
550 L=5:A=1:RETURN
560 L=5:A=0:RETURN
570 L=5:A=3:RETURN
580 L=8:A=1:RETURN
590 L=8:A=0:RETURN
600 L=9:A=1:RETURN
610 L=9:A=2:RETURN
620 L=9:A=0:RETURN
630 L=9:A=3:RETURN
640 L=6:RETURN
650 L=7:A=2:RETURN
660 L=7:A=1:RETURN
670 L=7:A=0:RETURN
680 L=7:A=3:RETURN
690 L=10:A=1:RETURN
700 L=10:A=2:RETURN
710 L=10:A=0:RETURN
720 L=10:A=3:RETURN
730 DATAU4E2F2D2L4R4D2,RU6LR3FDG
L2R2FDGL3BR4,BR4BUGL2HU4ER2FDBD4
,RU6LR3FD4GL2BR3,U3R4L4U3R4BD6L4
R4,U3R4L4U3R4BD6,BR2BU3R2D2GL2HU
4ER2FBD5,U6D3R4U3D6,BRR2LU6LR2BR
BD6,BU2DFREU5BD6,U6BR4G3F3,R4L4U
6BR4BD6,U6F2E2D6,U6DF4U5D6,R4L4U
6R4D6,U6R3FDGL3BR4BD3
740 DATABUU4ER2FD4GL2HBR2BUF2,U6
R3FDGL3RF3,BUFR2EUHL2HUER2FBD5,B
U6R4L2D6BR2,NU6R4NU6,BU6D4F2E2U4
BD6,NU6E2F2NU6,UE2H2UDF2E2UDG2F2
D,BU6DF2E2UDG2D3BR2,BU6R4DG2LR2L
G2DR4
750 DATACC,A,A0,FD,7E,FD,CC,A,B8
,FD,7E,FF,8E,A,A0,EC,81,ED,89,FB
,5E,BC,7E,FF,26,F5,CC,0,20,F3,7E
,FF,FD,7E,FF,CC,0,20,F3,7E,FD,FD
,7E,FD,8C,1D,58,27,5,BE,7E,FD,20
,D9,39,CC,19,40,FD,7E,FD,CC,19,5
8,FD,7E,FF,8E,19,58,EC,83,ED,89,
4,A0,BC,7E,FD,26,F5,CC
760 DATAFF,E0,F3,7E,FF,FD,7E,FF,
CC,FF,E0,F3,7E,FD,FD,7E,FD,8C,6,
0,27,5,BE,7E,FF,20,D9,39,CC,6,4,
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```
FD,7E,FD,CC,6,17,FD,7E,FF,8E,6,4
,A6,80,48,48,48,48,48,A7,1B,A6,8
4,44,44,44,AB,1B,A7,1B,BC,7E,FF,
26,E9,CC,0,20,F3,7E,FD,FD,7E,FD,
CC,0,20,F3,7E,FF,FD,7E
770 DATAFF,BE,7E,FD,8C,1D,E4,26,
CF,39,CC,5,FF,FD,7E,FD,CC,6,12,F
D,7E,FF,8E,6,12,A6,84,44,44,48,4
8,48,48,48,48,48,8B,7F,A7,5,A6,8
4,44,44,44,44,44,A7,4,A6,82,48,4
8,48,AB,5,A7,5,BC,7E,FD,26,E9,CC
,0,20,F3,7E,FD,FD,7E,FD,CC,0,20,
F3,7E,FF,FD,7E,FF,BE,7E
780 DATAFF,8C,1D,F2,26,C0,39
790 DATA152528080395000DRAGONS,15
1010250345000WIZARDS,10152005043
750GIANTS,06150804031650OGRES,061
5070000214000LG LIZARDS,05050510002
1250SERPENTS,050906050312500PRIES
TS,03050502040750SPIDERS,0102030
6040600BURGULARS,01020600020450G
IANT ANTS
800 DATA01040303030550GOBLINS,01
04030403060005KELETONS,01060602 01
0750ZOMBIES,02080606041100WERERA
TS,04110603051200HARPIES,0514060
5051500GARGOYLES,08200800041800T
ROLLS,103015000241 25HYDRAS,11104
900036300EVIL IDOLS.183022100599
99DEMONS
810 CP=1:PMODE4:COLOR0,1:PCLS:SC
REEN1,0:FORL=50TO130STEP20:LINE(
50,L)-(150,L+20),PSET,B:NEXT:FOR
L=70TO130STEP20:LINE(L,50)-(L,15
0),PSET:NEXT:L$="ADVENTURERS SET
UP":DRAW"BM10,10":J=17:GOSUB2070
:L$="HIT  P  TO PLACE":DRAW"BM18
,20":J=16:GOSUB2070
820 L$="CHARACTER UP":DRAW"BM166
,40":J=12:GOSUB2070:L$="DO NOT P
UT ADVENTURERS IN SAME BOX":DRAW
"BM0,181":J=34:GOSUB2070:L$="FAC
ING":DRAW"BM0,60":J=6:GOSUB2070:
DRAW"BM25,100U35NG15F15":X=56:Y=
56:X1=0:Y1=0:L$="STATUS":J=6:DRA
W"BM0,140":GOSUB2070
830 L$=N$(CP):DRAW"BM174,50":J=L
EN(N$(CP)):GOSUB2070
840 GET(X,Y)-(X+7,Y+7),CY,G
850 PUT(X,Y)-(X+7,Y+7),MC,PSET:P
UT(X,Y)-(X+7,Y+7),MC,NOT
860 L$=INKEY$:IFL$=""THEN850ELSE
IFL$=CHR$(94)THENY1=-20ELSEIFL$=
CHR$(10)THENY1=20ELSEIFL$=CHR$(8
)THENX1=-20ELSEIFL$=CHR$(9)THENX
1=20ELSEIFL$="P"THEN880ELSEIFL$=
"S"THENGOSUB2130:GOTO850ELSE850
870 IFX+X1<56ORX+X1>136ORY+Y1<56
ORY+Y1>136THENX1=0:Y1=0:GOTO850E
LSEPUT(X,Y)-(X+7,Y+7),CY,PSET:X=
```

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```
X+X1:Y=Y+Y1:X1=0:Y1=0:GOTO840
880 IFCP=1THENPUT(X,Y)-(X+7,Y+7)
,MC,PSET ELSEIFN$(CP)="MERCENARY
"THENPUT(X,Y)-(X+7,Y+7),MR,PSET
ELSEPUT(X,Y)-(X+7,Y+7),HM,PSET
890 CP(CP,0)=INT((X-56)*.6+62):C
P(CP,2)=CP(CP,0):CP(CP,1)=INT((Y
-56)*.6+133):CP(CP,3)=CP(CP,1):C
P=CP+1:IFCP=C9+1THEN900ELSELINE(
174,44)-(255,50),PRESET,BF:GOTO8
30
900 L$="REDO YES OR NO":DRAW"BM1
60,100":J=14:GOSUB2070
910 L$=INKEY$:IFL$="Y"THEN810ELS
EIFL$="N"THENRETURNELSE910
920 FORL=104TO118:IFPPOINT(92,L)
=0THENRETURNELSENEXT:GOSUB2100
930 YP=YP+1:PUT(88,125)-(95,132)
,MC,PSET:EXEC&H7F01:LINE(0,148)-
(185,191),PRESET,BF:X=18:FORJ=XP
-2TO XP+2:DP=PEEK(31000+(YP+2)*3
1+J):IFDP>30THENDP=DP-30:Y=166:G
OSUB2090
940 GOSUB410:DRAW"BM"+STR$(X)+",
166A"+STR$(A)+DP$(L):X=X+37:NEXT
950 RETURN
960 FORL=66TO80:IFPPOINT(92,L)=0
THENRETURNELSENEXT:GOSUB2100
970 YP=YP-1:PUT(88,51)-(95,58),M
C,PSET:EXEC&H7F38:LINE(0,0)-(185
,36),PRESET,BF:X=18:FORJ=XP-2TO
XP+2:DP=PEEK(31000+(YP-2)*31+J):
IFDP>30THENDP=DP-30:Y=18:GOSUB20
90
980 GOSUB410:DRAW"BM"+STR$(X)+",
18A"+STR$(A)+DP$(L):X=X+37:NEXT
990 RETURN
1000 FORL=104TO118:IFPPOINT(L,92
)=0THENRETURNELSENEXT:GOSUB2100
1010 XP=XP+1:PUT(125,88)-(132,95
),MC,PSET:EXEC&H7F6F:LINE(148,0)
-(185,191),PRESET,BF:Y=18:FORJ=Y
P-2TO YP+2:DP=PEEK(31002+J*31+XP
):IFDP>30THENDP=DP-30:X=166:GOSU
B2090
1020 GOSUB410:DRAW"BM166,"+STR$(
Y)+"A"+STR$(A)+DP$(L):Y=Y+37:NEX
T:RETURN
1030 FORL=66TO80:IFPPOINT(L,92)=
0THENRETURNELSENEXT:GOSUB2100
1040 XP=XP-1:PUT(51,88)-(58,95),
MC,PSET:EXEC&H7FB0:LINE(0,0)-(36
,191),PRESET,BF:Y=18:FORJ=YP-2 T
OYP+2:DP=PEEK(30998+J*31+XP):IFD
P>30THENDP=DP-30:X=18:GOSUB2090
1050 GOSUB410:DRAW"BM18,"+STR$(Y
)+"A"+STR$(A)+DP$(L):Y=Y+37:NEXT
:RETURN
1060 FORL=0TO10:IFCA(L,0)<>XP AN
DCA(L,1)<>YP THENNEXTELSE1100
1070 FORL=0TO10:IFCA(L,0)<>0THEN
NEXTELSE1090
1080 GOTO1120
1090 CA(L,0)=XP:CA(L,1)=YP:CA(L,
2)=R
1100 NU=31000+YP*31+XP:POKENU,PE
EK(NU)-30:IFK$=CHR$(94)THENYP=YP
+1ELSEIFK$=CHR$(10)THENYP=YP-1EL
SEIFK$=CHR$(8)THENXP=XP+1ELSEXP=
XP-11110 GOTO220
1120 'FIGHT SEQUENCE
1130 PMODE4:COLOR0,1:SCREEN1,0
1140 PCLS:FORK=23TO179STEP12:FOR
L=12TO168STEP12:PSET(L,K):NEXTL,
K:LINE(0,11)-(180,191),PSET,B:J=
LEN(MO$(R))-15:L$=RIGHT$(MO$(R),
J+1):DRAW"BM30,10":GOSUB2070:L$=
" FIGHT":J=6:GOSUB2070:L$="MOVE"
:J=4:DRAW"BM184,150":GOSUB2070:L
$="FIGHT":J=5
1150 DRAW"BM184,160":GOSUB2070:L
$="POTION":J=6:DRAW"BM184,170":G
OSUB2070:L$="STATUS":J=6:DRAW"BM
184,180":GOSUB2070:CP=1:L$="UP":
J=2:DRAW"BM212,60":GOSUB2070
1160 FORL=1TO RND(6)-1
1170 X=INT(RND(143)/12)*12:Y=INT
(RND(80)/12)*12+11:LINE(X,Y)-(X+
RND(4)*12,Y+RND(4)*12),PSET,BF:N
EXT
```

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```
1180 SOUND200,1:X=CP(CP,0):Y=CP(
CP,1):IFCP=1THENPUT(X,Y)-(X+7,Y+
7),MC,PSETELSEIFN$(CP)="MERCENAR
Y"THENPUT(X,Y)-(X+7,Y+7),MR,PSET
ELSEPUT(X,Y)-(X+7,Y+7),HM,PSET
1190 CP=CP+1:IFCP<>C9+1THEN1180E
LSEAL=VAL(LEFT$(MO$(R),2)):MP(0,
2)=VAL(MID$(MO$(R),3,2)):DF=VAL(
MID$(MO$(R),5,2)):DP=VAL(MID$(MO
$(R),7,2)):MP=VAL(MID$(MO$(R),9,
2)):NU=0:FORL=1TO10:NU=NU+AL(L):
NEXT:NU=INT(NU/(RND(0)+.70)/AL)
1200 IFNU>50THENNU=50ELSEIFNU<1T
HENNU=1
1210 EX=VAL(MID$(MO$(R),11,4))*N
U
1220 FORL=1TO NU-1:MP(L,2)=MP(0,
2):NEXT
1230 FORL=0TO NU-1
1240 X=INT(RND(160)/12)*12+14:Y=
INT((RND(180)+11)/12)*12+1:IFPPO
INT(X+4,Y+4)=0THEN1240ELSEIFX>59
ANDX<121ANDY>130THEN1240ELSEMP(L
,0)=X:MP(L,1)=Y:PLAY"V3002T255L2
55":FORK=1TO30:PLAY"CCDV-":NEXT:
FORK=1TO5STEP2:CIRCLE(X+4,Y+4),K
:NEXTK,L
1250 TT=0:L=RND(100):IFL>50THEN1
550ELSECP=1
1260 L$=N$(CP):J=LEN(L$):DRAW"BM
184,70":GOSUB2070:X=CP(CP,0):Y=C
P(CP,1):GET(X,Y)-(X+7,Y+7),CY,G
1270 DRAW"BM204,140C0NU30NH15NE1
5":PUT(X,Y)-(X+7,Y+7),CY,PRESET:
DRAW"BM204,140C1NU30NH15NE15C0":
PUT(X,Y)-(X+7,Y+7),CY,PSET
1280 K$=INKEY$:IFK$=""THEN1270EL
SEIFK$="M"GOSUB1320ELSEIFK$="F"G
OSUB1380ELSEIFK$="P"GOSUB1500ELS
EIFK$="S"GOSUB2130:GOTO1270ELSE1
270
1290 IFNU=0THEN1730
1300 CP(CP,0)=X:CP(CP,1)=Y:LINE(
184,63)-(255,70),PRESET,BF:CP=CP
+1:IFCP=C9+1THENTT=TT+1ELSE1260
1310 IFTT=2THEN1250ELSE1550
1320 PUT(X,Y)-(X+7,Y+7),CY,PSET:
PUT(X,Y)-(X+7,Y+7),MO,PRESET
1330 K$=INKEY$:IFK$=""THEN1320EL
SEIFK$=CHR$(94)THENL=Y-6:J=Y-1:K
=X ELSEIFK$=CHR$(10)THENL=Y+8:J=
Y+14:K=X ELSEIFK$=CHR$(8)THENL=X
-6:J=X-1:K=Y ELSEIFK$=CHR$(9)THE
NL=X+8:J=X+14:K=Y ELSEIFK$=CHR$(
13)THENCC=0:PUT(X,Y)-(X+7,Y+7),C
Y,PSET:RETURNELSE1320
1340 IFK=X THEN1350ELSEFORLL=L T
O J:IFPPOINT(LL,K)=0THEN1320ELSE
NEXT:GOTO1360
1350 FORLL=L TO J:IFPPOINT(K,LL)
=0 OR PPOINT(K+1,LL)=0THEN1320EL
SENEXT
1360 IFK$=CHR$(94)THENY=Y-12ELSE
IFK$=CHR$(10)THENY=Y+12ELSEIFK$=
CHR$(9)THENX=X+12ELSEIFK$=CHR$(8
)THENX=X-12
1370 CC=CC+1:IFCC=3+PO(CP,3)THEN
CC=0:PUT(X,Y)-(X+7,Y+7),CY,PSET:
RETURNELSE1320
1380 L$="E R T":J=5:DRAW"BM190,9
0":GOSUB2070:L$="D     G":J=6:DRA
W"BM190,100":GOSUB2070:L$="C V B
":J=5:DRAW"BM190,110":GOSUB2070:
GET(X,Y)-(X+7,Y+7),CY,G
1390 PUT(X,Y)-(X+7,Y+7),MO,PRESE
T:PUT(X,Y)-(X+7,Y+7),CY,PSET:K$=
INKEY$:IFK$=""THEN1390
1400 IFK$="E"THENX1=-12:Y1=-12EL
SEIFK$="R"THENX1=0:Y1=-12ELSEIFK
$="T"THENX1=12:Y1=-12ELSEIFK$="G
"THENX1=12:Y1=0ELSEIFK$="B"THENX
1=12:Y1=12ELSEIFK$="V"THENX1=0:Y
1=12ELSEIFK$="C"THENX1=-12:Y1=12
ELSEIFK$="D"THENX1=-12:Y1=0ELSEI
FK$="Q"THEN1440ELSE1390
1410 FORL=0TO NU-1:IFMP(L,0)=X+X
1 ANDMP(L,1)=Y+Y1 THEN1420ELSENE
XT:GOTO1390
1420 L=RND(100):IFL<(AL(CP)+PO(C
P,0))*3-DP+40THEN1450
```

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```
1430 FORL=1TO20:PLAY"T255L255V15
O3CO4C":NEXT:DRAW"BM190,130":L=R
ND(8):IFL=1THENL$="STUPID":J=6:G
OSUB2070ELSEIFL=2THENL$="WIMP":J
=4:GOSUB2070ELSEIFL=3THENL$="LOS
ER":J=5:GOSUB2070ELSEIFL=4THENL$
="SWISH":J=5:GOSUB2070
1440 FORL=1TO500:NEXT:LINE(185,8
0)-(255,130),PRESET,BF:RETURN
1450 PLAY"V20T4L4O3GO4CL3EL4CE":
DRAW"BM190,130":L=RND(6):IFL=1TH
ENL$="POW":J=3:GOSUB2070ELSEIFL=
2THENL$="BAM":J=3:GOSUB2070ELSEI
FL=3THENL$="CLOBBER":J=7:GOSUB20
70ELSEIFL=4THENL$="SLASH":J=5:GO
SUB2070ELSEIFL=5THENL$="SMASH":J
=5:GOSUB2070
1460 FORL=1TO500:NEXT
1470 FORL=0TO NU-1:IFMP(L,0)<>X+
X1 ORMP(L,1)<>Y+Y1 THENNEXT
1480 MP(L,2)=MP(L,2)-RND(DF(CP)+
PO(CP,1)):IFMP(L,2)>0THENLINE(18
5,80)-(255,130),PRESET,BF:RETURN
ELSEFORJ=1TO5STEP2:CIRCLE(MP(L,0
)+4,MP(L,1)+4),J,1:NEXT:LINE(185
,80)-(255,130),PRESET,BF
1490 FORK=L TO NU-1:MP(K,0)=MP(K
+1,0):MP(K,1)=MP(K+1,1):MP(K,2)=
MP(K+1,2):NEXT:NU=NU-1:RETURN
1500 L=1:CLS:PRINT" 0 NONE"
1510 PRINTL;PO$(L):IFPO$(L+1)<>"
"THENL=L+1:GOTO1510ELSEINPUT"whi
ch one";L:IFPO$(L)=""THENPMODE4:
COLOR0,1:SCREEN1,0:RETURN
1520 IFLEN(PO$(L))=15THENPO(CP,0
)=PO(CP,0)+RND(4)+4ELSEIFMID$(PO
$(L),11,1)="H"THENBP(CP)=B(CP)EL
SEIFMID$(PO$(L),11,1)="S"THENPO(
CP,1)=PO(CP,1)+RND(10)+8ELSEIFMI
D$(PO$(L),11,1)="R"THENPO(CP,2)=
PO(CP,2)+RND(20)+10ELSEPO(CP,3)=
7
1530 FORK=L TO9:PO$(K)=PO$(K+1):
NEXT:PMODE4:COLOR0,1:SCREEN1,0:R
ETURN
1540 GOTO1540
1550 MO=0:J=LEN(MO$(R))-15:L$=MI
D$(MO$(R),15,J):DRAW"BM184,70":G
OSUB2070
1560 CP=1:HY=300
1570 L=INT(SQR(ABS(CP(CP,0)-MP(M
O,0))^2+ABS(CP(CP,1)-MP(MO,1))^2
)):IFL<HY THENX1=CP(CP,0):Y1=CP(
CP,1):HY=L:C1=CP
1580 CP=CP+1:IFCP<>C9+1THEN1570
1590 IFHY<20THEN1670ELSEM1=MP:X2
=MP(MO,0):Y2=MP(MO,1)
1600 IFABS(X1-X2)>ABS(Y1-Y2)ANDP
POINT(X2+16,Y2+4)<>0ANDPPOINT(X2
+17,Y2+4)<>0ANDSGN(X1-X2)<>-1AND
X2<169THENX2=X2+12:GOTO1640ELSEI
FPPOINT(X2+4,Y2+16)<>0ANDPPOINT(
X2+5,Y2+16)<>0ANDSGN(Y1-Y2)<>-1T
HENY2=Y2+12:GOTO1640
1610 IFSGN(X1-X2)<>-1ANDPPOINT(X
2+16,Y2+4)<>0ANDPPOINT(X2+17,Y2+
4)<>0ANDX2<169THENX2=X2+12:GOTO1
640
1620 IFABS(X1-X2)>ABS(Y1-Y2)ANDP
POINT(X2-8,Y2+4)<>0ANDPPOINT(X2-
7,Y2+4)<>0THENX2=X2-12:GOTO1640E
LSEIFPPOINT(X2+4,Y2-8)<>0ANDPPOI
NT(X2+5,Y2-8)<>0ANDSGN(Y2-Y1)=1T
HENY2=Y2-12:GOTO1640
1630 IFPPOINT(X2-8,Y2+4)<>0ANDPP
OINT(X2-7,Y2+4)<>0THENX2=X2-12
1640 FORL=1TO5STEP2:CIRCLE(MP(MO
,0)+4,MP(MO,1)+4),L,1:NEXT:MP(MO
,0)=X2:MP(MO,1)=Y2:SOUND200,1:FO
RL=1TO5STEP2:CIRCLE(X2+4,Y2+4),L
,0:NEXT:M1=M1-1:IFM1=0ANDMO=NU-1
THEN1660ELSEIFM1=0THENMO=MO+1:GO
TO1560
1650 L=INT(SQR(ABS(X1-X2)^2+ABS(
Y1-Y2)^2)):IFL<20ANDMO=NU-1THEN1
660ELSEIFL<20THENMO=MO+1:GOTO156
0ELSE1600
1660 TT=TT+1:IFTT=1THENCP=1:LINE
(184,63)-(255,70),PRESET,BF:GOTO
1260ELSELINE(184,63)-(255,70),PR
```

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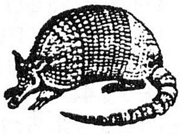

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```
ESET,BF:GOTO1250
1670 FORL=1TO5STEP2:CIRCLE(MP(MO
,0)+4,MP(MO,1)+4),L,1:CIRCLE(MP(
MO,0)+4,MP(MO,1)+4),L,0:NEXT:L=R
ND(100):IFL<AL*3.75-DP(C1)-PO(C1
,2)+25THEN1690
1680 L$="MISSED":J=6:DRAW"BM185,
120":GOSUB2070:PLAY"T12L404V15BA
GFDEC":FORL=1TO500:NEXT:LINE(185
,113)-(250,120),PRESET,BF:MO=MO+
1:IFMO=NU THEN1660ELSE1560
1690 PLAY"T4V25L204DL403B04EL2DO
3B":L$="HIT":J=3:DRAW"BM195,120"
:GOSUB2070:BP(C1)=BP(C1)-RND(DF)
:GET(X1,Y1)-(X1+7,Y1+7),CY,G:FOR
L=1TO20:PUT(X1,Y1)-(X1+7,Y1+7),C
Y,PRESET:PUT(X1,Y1)-(X1+7,Y1+7),
CY,PSET:NEXT:LINE(185,113)-(250,
120),PRESET,BF
1700 MO=MO+1:IFBP(C1)>0ANDMO=NU
THEN1660
1710 IFBP(C1)>0THEN1560ELSELINE(
X1,Y1)-(X1+7,Y1+7),PRESET,BF:FOR
L=C1 TO C9
1715 CP(L,0)=CP(L+1,0):CP(L,1)=C
P(L+1,1):B(L)=B(L+1):BP(L)=BP(L+
1):DF(L)=DF(L+1):DP(L)=DP(L+1):A
L(L)=AL(L+1):EX(L)=EX(L+1):N$(L)
=N$(L+1):PO(L,0)=PO(L+1,0):PO(L,
1)=PO(L+1,1):PO(L,2)=PO(L+1,2):P
O(L,3)=PO(L+1,3):NEXT:LC=1:C9=C9
-1:IFC1=1THEN2270
1720 IFMO=NU THEN1660ELSE1560
1730 'BOUTY PHASE
1740 CLS:PRINT"experience collec
ted";EX*(1-((AL(1)-1)*.05)):PRIN
T"credits collected";:C2=INT(EX/
(RND(C9)+1)):CR=CR+C2:PRINTC2:PR
INT"credits to date";CR:PRINT"po
tions collected":L=RND(10):IFL>A
L THENPRINT"NONE":GOTO1840
1750 FORL=1TO10:IFPO$(L)=""THEN1
770ELSENEXT
1760 PRINT"NONE":GOTO1840
1770 K=RND(5):ON K GOTO1780,1790
,1800,1810,1820
1780 PO$(L)="POTION OF SKILL":GO
TO1830
1790 PO$(L)="POTION OF HEALING":
GOTO1830
1800 PO$(L)="POTION OF STRENGTH"
:GOTO1830
1810 PO$(L)="POTION OF REFLEXES"
:GOTO1830
1820 PO$(L)="POTION OF QUICKNESS
"

1830 PRINTPO$(L)
1840 PRINT:PRINT:PRINT"<enter>":
EX=EX*(1-((AL(1)-1)*.05))
1850 K=C9-1
1860 IFK<>0THENFORL=2TO C9:IFN$(
L)<>"MERCENARY"THEN EX(L)=EX(L)+
EX/2/K:NEXTELSENEXT
1870 EX(1)=EX(1)+EX/2
1880 L$=INKEY$:IFL$=""THEN1880
1890 FORL=1TO C9:AL=AL(L):AL(L)=
INT(EX(L)/3280+1):IFAL<>AL(L)THE
NB(L)=B(L)+RND(2):NEXTELSENEXT
1900 FORL=1TO10:FORK=0TO3:PO(L,K
)=0:NEXTK,L
1910 IFAL(1)=20THEN2280
1920 IFLC=1THENLC=0:GOTO810ELSEF
ORL=1TO10:CP(L,0)=CP(L,2):CP(L,1
)=CP(L,3):NEXT:RETURN
1930 CLS:PRINT"STAYING IN TOWN H
AS COST YOU":L=RND(100)+100:PRIN
TL;"CREDITS":CR=CR-L:FORL=1TO C9
:BP(L)=B(L):NEXT:GOSUB2120
1940 GOSUB2110:PRINT"(1)DO YOU W
ANT TO GAIN LEVELS.":PRINT"(2)HI
RE ON HENCHMEN, MERCENARIES";:PR
INT"(3)GO BACK TO THE DUNGEON.":
INPUTL:IFL=3GOSUB810:GOTO220ELSE
IFL=1THEN1950ELSEIFL=2THEN1990EL
SE1940
1950 CLS:GOSUB2110:FORL=1TO C9:P
RINTL;N$(L):NEXT:INPUT"WHO IS TO
 GAIN EXPERIENCE";L:IFN$(L)=""TH
ENCLS:GOTO1940
```

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```
1960 INPUT"HOW MANY CREDITS ARE
YOU       SPENDING";K:IFK<0THEN
1950ELSEIFK>CR THENK=CR
1970 EX=(RND(0)+.5)*CR:PRINT"YOU
 HAVE GAINED ";:PRINT USING"#.##
";EX/3280;:PRINT" PERCENT    OF
A LEVEL":EX(L)=EX(L)+EX:AL=AL(L)
:AL(L)=INT(EX(L)/3280+1):CR=CR-K
:PRINT:PRINT"     <enter>";:IFAL<
>AL(L)THENB(L)=B(L)+RND(2)
1980 K$=INKEY$:IFK$=""THEN1980EL
SECLS:GOTO1940
1990 CLS:GOSUB2110
2000 IFC9=10THENPRINT"NO ONE WAN
TS A JOB":ELSE2020
2010 K$=INKEY$:IFK$=""THEN2010EL
SECLS:GOTO1940
2020 PRINT"HENCHMEN COST 2000 CR
EDITS":PRINT"MERCENARIES COST 15
00 CREDITS":PRINT"ENTER 0 CREDIT
S FOR NEITHER":INPUT"AMOUNT";L:I
FL=1500THENCR=CR-L:GOSUB2120:GOT
O2030ELSEIFL=2000THENCR=CR-L:GOS
UB2120:GOTO2040ELSECLS:GOTO1940
2030 C9=C9+1:L=C9:N$(L)="MERCENA
RY":BP(L)=8:B(L)=8:DF(L)=6:DP(L)
=6:EX(L)=3300:AL(L)=2:CLS:GOTO19
40
2040 C9=C9+1:L=C9:BP(L)=RND(8)+3
:DF(L)=RND(7)+2:DP(L)=RND(7)+2:B
(L)=BP(L):EX(L)=3300:AL(L)=2:PRI
NT"WHAT NAME FOR YOUR HENCHMAN
   (UNDER 9 LETTERS)":PRINT"BODY
 PT/DAMAGE FAC./DEFENSE PTS.";:P
RINTTAB(4)B(L);TAB(15)DF(L);TAB(
27)DP(L)
2050 INPUTL$:N$(L)=L$:CLS:GOTO19
40
2060 GOTO2060
2070 FORL=1TO J:LL=ASC(MID$(L$,L
,1))-65:IFLL<0THENDRAW"A0BR4"ELS
EDRAW"A0C0"+L$(LL)+"BR4"
2080 NEXT:RETURN
2090 DRAW"BM"+STR$(X)+","+STR$(Y
)+"NE2NF2NG2H2":RETURN
2100 DRAW"BM92,92NE2NF2NG2H2":RE
TURN
2110 PRINT"you have";CR;"credits
":RETURN
2120 IFCR<0GOTO2260ELSERETURN
2130 CLS:PRINT"     ATT. LVL./BOD
Y/DAM FAC./DEF.";
2140 FORK=1TO C9:PRINTN$(K);:PRI
NTTAB(10)AL(K)+PO(K,0);TAB(14)BP
(K);TAB(21)DF(K)+PO(K,1);TAB(27)
DP(K)+PO(K,2):NEXT:PRINT:PRINT"C
REDITS";CR
2150 K$=INKEY$:IFK$=""THEN2150EL
SEPMODE4:COLOR0,1:SCREEN1,0:RETU
RN
```

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★ *Universal Program 1 (UP-1)* ★

The Program Stacking Program. UP-1 allows several programs to be loaded until the memory is filled. Quickly jump from one program to another or compose new ones while retaining the old ones. Programs included for patching damaged programs. UP-1 also allows text to be stored in memory and printed on an external printer. Cassette $14.95

★ *Disassembler-Assembler (DISASM)* ★

Using English mnemonics and decimal locations, DISASM is a quick way to learn to assemble machine language programs. Analyze the CC ROMS plus ML programs with the disassembler. Cassette $19.95

★ *Dynamic Word Processor (DYWORD)* ★

Organize text into remark statements with DYWORD's machine language subroutine, which quickly prints to screen or an external printer. Use the LIST command to quickly review the text. Only the start and ending statement numbers need be entered for execution. No more arrays, CHR$(N), PRINT#-2, or other awkward commands are required. Enter exactly what you want printed in the statements, including printer control commands. Allows printing form letters, purchase orders, personal and business letters. No extra memory is required and the Basic Control Program is easily modified. Cassette $24.95

16K Computer Required Programs Do Not Require Ext. Basic

Game Cartridge Modifications

★ *Dynamic Interrupt Modification (DIM)* ★

This modification includes adding a push button which, when engaged, causes an interrupt. The computer then runs a machine language subroutine after which it returns to its previous task. Examples include printing the characters on the screen to an external printer and saving the screen to memory. The Auto Start feature is disabled and the game is run by EXEC 49152. Example programs are included. Send Cart & $15.95.

★ *EPROM Socket Addition (ESA)* ★

This modification involves adding a socket and switch to select the EPROM or game. A 4K or less Basic or machine language program can be placed in the EPROM. Send Cart and $18.95.

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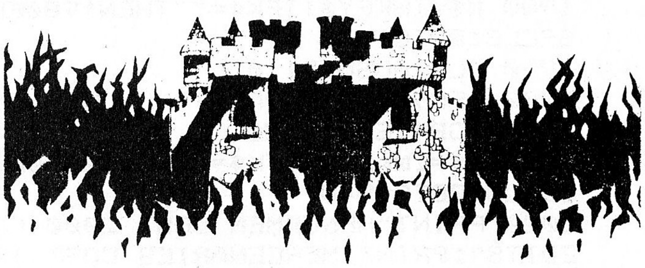
```
2160 PLAY"V31L255T25504":FORL=1T
030:PLAY"BAGFEDCV-":NEXT:PLAY"O2
V31L20T20BAG":FORL=1TO30:PLAY"GV
-":NEXT:PCLS:L$="YOUR PARTY HAS
BEEN SURPRISED BY":J=32:DRAW"BM1
0,80":GOSUB2070:DRAW"BRBURULDBU3
RULD":R=RND(20)-1:J=LEN(MO$(R))-
14
2170 L$=RIGHT$(MO$(R),J):DRAW"BM
99,90":GOSUB2070:FORL=1TO1000:NE
XT:GOSUB1120:PMODE4:COLOR0,1:PCL
S:SCREEN1,0:RETURN
2180 CLS:INPUT"DO YOU WISH TO SA
VE DUNGEON        (Y/N)";L$:IFL$="N
"THENPMODE4:COLOR0,1:SCREEN1,0:G
OTO260
2190 POKE65495,0:J=32000:FORL=1T
O C9:POKEJ,BP(L):POKEJ+1,DF(L):P
OKEJ+2,DP(L):L$=HEX$(EX(L)):POKE
J+3,VAL("&H"+LEFT$(L$,LEN(L$)-2)
):POKEJ+4,VAL("&H"+RIGHT$(L$,2))
:J=J+5:NEXT:POKEJ,42:J=J+1
2200 FORL=1TO C9:FORK=1TO LEN(N$
(L)):POKEJ,ASC(MID$(N$(L),K,1)):
J=J+1:NEXT:POKEJ,42:J=J+1:NEXT:P
OKEJ,0:J=J+1:FORL=1TO C9:POKEJ,B
(L):J=J+1:NEXT:POKEJ,42:L$=HEX$(
CR):IFLEN(L$)<3THENPOKEJ+1,0:POK
EJ+2,VAL("&H"+L$):POKEJ+3,42:GOT
O2220
2210 POKEJ+1,VAL("&H"+LEFT$(L$,L
EN(L$)-2)):POKEJ+2,VAL("&H"+RIGH
T$(L$,2)):POKEJ+3,42
2220 J=J+4:FORL=0TO10:POKEJ,CA(L
,0):POKEJ+1,CA(L,1):POKEJ+2,CA(L
,2):J=J+3:NEXT:L=1
2230 IFPO$(L)=""THEN2240ELSEK=LE
N(PO$(L)):FORLL=1TO K:POKEJ,ASC(
MID$(PO$(L),LL,1)):J=J+1:NEXT:PO
KEJ,42:J=J+1:L=L+1:GOTO2230
2240 POKEJ,255:POKE31962,XP:POKE
31963,YP:PRINT"PLACE TAPE OF ADV
ENTURES          IN RECORDER PRESS
 PLAY & RECORD":INPUT"NAME OF CU
RRENT ADVENTURE";L$:IFLEN(L$)>8T
HENL$=LEFT$(L$,8)
2250 POKE65494,0:CSAVEML$,31000,
32767,0:END
2260 CLS:PRINT@100,"THERE ARE NO
 LOANS MADE           IN THIS GAME
 BUDDY,               YOU'RE GOING
 TO JAIL.":PRINT@400,"GAME OVER"
:FORL=1TO1000:NEXT:END
2270 FORL=1TO10:SCREEN1,1:SCREEN
1,0:NEXT:PLAY"V31T2L2O2BP64BP64L
8BP64L2BO3P64DP64L8D-P64L4D-P64L
4O2BP64BP64B-P64L1B":END
2280 FORL=1TO1000:NEXT:POKE65495
,0:CLS0:L$=CHR$(128):CO$=L$+"you
"+L$+"have"+L$+"attained"+L$+"je
di"+L$+"knight"+L$:FORL=0TO224:P
RINT@L,CO$;:NEXT:POKE65494,0:PLA
Y"T30L4V30":FORL=1TO30:PLAY"O3GO
4CL3EL4CEV-":NEXT
2290 FORK=1TO100:L=RND(15)-1:IFL
=7THENNEXTELSEC=143+16*(RND(8)-1
):PRINT@L*32,STRING$(32,C);:NEXT
2300 FORL=0TO14:IFL=7THENNEXTELS
EPRINT@L*32,STRING$(32,128);:NEX
T:FORL=224TO0STEP-1:PRINT@L,CO$;
:NEXT:FORL=1TO15:PRINT@L*32,CO$;
:NEXT:FORL=0TO14:PRINT@L*32,STRI
NG$(32,128);:NEXT
2310 FORL=1TO30:PRINT@L-1,MID$(C
O$,L,1);:PRINT@L+479,CHR$(128);:
NEXT:CN$="congratulations"+L$+"c
hamp":K=0
2320 L=RND(21):IFMID$(CN$,L,1)="
X"THEN2320ELSEPRINT@228+L,MID$(C
N$,L,1);:MID$(CN$,L,1)="X":K=K+1
:IFK<>21THEN2320
2330 PRINT@350,"";:END
```



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When we first introduced FLEX for the CoCo in February 1982 we received hundreds of calls from software and hardware developers who wanted to use the CoCo because it was so inexpensive compared to everything else on the market. However there is not enough in the CoCo to make this possible for most of these users. I know that the CoCo is viable in most cases, but for many, there needed to be more. So that was the original reason for designing the expansion board we call 'THE SOLUTION'.

After we finished the design we looked at what we had and tried to find a name for it. While I was trying to think of a name for this product that solved all the deficiencies that the CoCo had the name was obvious. The Solution solves all the deficiencies that we found in the CoCo so we named it **'THE SOLUTION'**.

The solution is housed in a metal case that plugs into the side of the CoCo. Inside are two boards, the buffer board and the motherboard. The buffer board connects to the port of the CoCo and is mounted to the side of the solutions case. The motherboard connects to the buffer board via a ribbon cable. The motherboard has the 2K/4K EPROM sockett with a 4K monitor EPROM in it. Also inside are 4 vertical connectors for internally mounted boards or ROM type cartridges. The fifth connector is horizontal and is made for the disk controller, ROM cartridges or additional expansion out the side of the solution. A four position dip switch allows for 3 options to be selected. One option will cause the CoCo to get its interrupt and reset vectors from the monitor instead of RS Basic. Another option makes the system come up in the monitor instead of RS Basic. While another option lets the CoCO come up in the monitor on the ACIA serial port that would be hooked to a terminal. This last option means that it is unnecessary to have the CoCo nearby to run FLEX or OS-9. Also if you choose to come up in the monitor then it is not necessary to have RS Extended Basic in the CoCo to boot FLEX because the monitor has a boot built in to it. This save \$100.00 or half of the cost of the solution. The power supply is a plug in the wall type with a connector in the back of the case. The back of the case is open and it is thru this that all the cables for the different cards go. This makes for a very neat appearance. The solution is painted black to match both the CoCo and the System 100.

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Software Review...

These Two Business Programs Offer A Lot

We read the other day that Radio Shack does not plan to come out with a general ledger package for CoCo. Too bad, because we believe there are a couple of programs now on the market that show that CoCo can be used for this purpose—and without a lot to be given away, either.

In truth, I believe *Disk Double Entry (DDE)* has most of the advantages of my Model II *General Ledger* program. Maybe not every single one, but it is a fine rendition that will make things work quite well.

On the other hand, *Small Business Accounting Package (SBAP)* is an excellent program that will give you a whole range of necessary information you need to keep up to date with business finances. It, by the way, is part of a system which will be coming available to give all aspects of financial needs for a small business when it is complete later this year.

What's the difference? To our mind, a main one is that *DDE* is more accounting-oriented while *SBAP* is better suited to the businessman who doesn't know his debits from his credits. Let's clarify that a bit. A good course in bookkeeping or Accounting 101 will more than qualify you for *DDE*. You don't need a CPA to understand it—although some knowledge of basic accounting is helpful.

Both will do a fine job of keeping your books up to date. *SBAP* is wider in scope in that it has modules for payroll and gives aging reports for accounts payable and receivable, but *DDE* has a great deal of depth to it. *DDE* is a general ledger system while *SBAP* is a "ledgerless" but full-blown system. Both, we believe, will fit well into your business (or, even, home) needs, depending on the amount of detail and complexity you want and need.

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Here is a look at each:

Disk Double Entry

DDE is based heavily on general accounting principles. So, if you never figured out the difference between a debit and a credit ("debits by the door, credits by the window" we were taught—but then all the rooms faced the same way!) then it is probably not for you. Custom Software Engineering, which sells the program, makes this pretty clear in its advertising, advising buyers to have basic understanding of double entry bookkeeping (no, that's *not* keeping two sets of books).

This single comment aside, it is a great program. The entry of transactions is easy, the reports can be formatted to your own liking, and CoCo "beeps" you if you do something wrong.

The program is capable of handling 300 separate accounts and about 1400 transactions on a single disk drive. It allows you to close out months or quarters, gives year-to-date and current period information and prints out the normal reports one would expect from a package of this sort—balance sheet, trial balance and income statement. One of the things we particularly like is an easy method of handling dates and of balancing your balance sheet at any time during a period.

Let's explain the latter. In most accounting systems, you will always be out of balance on the balance sheet until you close out a period (usually a month or quarter). When you do, any profit you have made during the period is automatically swept into an account which is usually called "Year-To-Date Profit and Loss." This account is what "balances" your balance sheet. So in the middle of the period, you are always out of balance by the amount of profit you have made.

DDE sets up an account it calls "Additional Retained Earnings" which lets your balance sheet balance. Handy, especially if you need an up-to-date balance sheet and you're in the midst of a month.

But, what makes us especially fond of *DDE* is the ease in which you can enter a transaction. After selecting this option, the program automatically numbers the transaction for you and then sets the screen for entry. You enter the account number to which you wish to post part of the transaction, and it prints out the name of the account. You then enter whether you want a debit or a credit to that account. The program keeps tabs at the bottom of the screen as to how much you have entered as a debit and how much to a credit. One quick glance lets you know whether you are in balance or not.

But that is not all. Once you have posted an offsetting entry, if you are not in balance, the program will not accept the entry. A beep warns you.

You also have the option of printing comments with each transaction—which can or cannot be shown on an audit trail printout. You may also erase an entry, insert an entry or change figures. To be honest, the data entry is very smooth and much faster than our General Ledger for the Model II.

The most difficult part of *DDE* is getting started. You cannot just sit down and start listing out accounts. This has some advantages and disadvantages. The advantages are that you have the option of formatting the accounts (and your financial statements) any way you wish. The disadvantage is that it, obviously, takes some time.

However, once your chart of accounts have been set up that does not mean they are cast in stone. You can delete accounts (as long as there is no balance in them), add accounts and, even, change the type of account. As we said, this takes a little while to do, but it is not terribly difficult—

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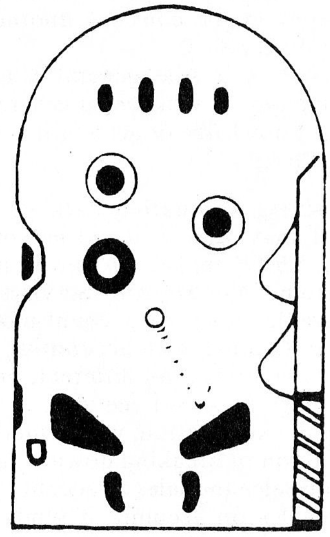

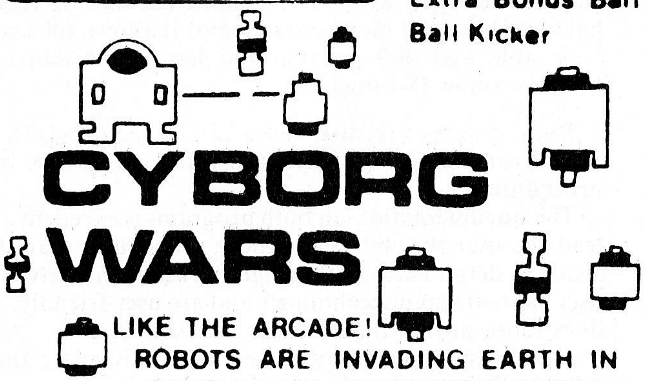

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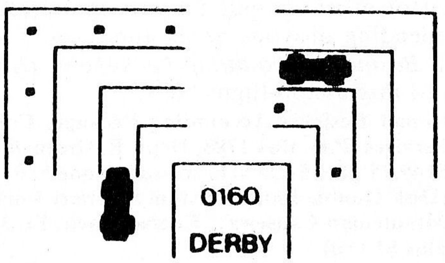

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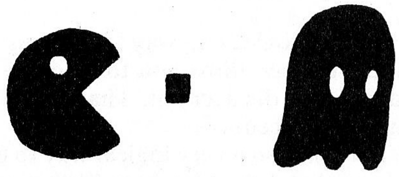

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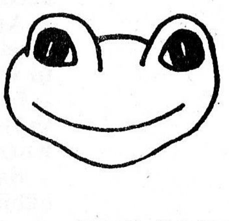

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DEALER, AUTHOR INQUIRIES INVITED

assuming you know what you want to do with an accounting program in the first place.

We should point out that saying there are 300 possible accounts is something of a misnomer. Some of these accounts should be used as "headings" and "total" accounts. However, we do not believe a small business could possibly use all of the 300 accounts available, anyway.

There is no accounts receivable module here, nor an accounts payable. It would be possible, of course, to use some of the accounts for these areas. And, there is some talk that Custom might consider another package for these functions if necessary.

But *DDE* is a fine general ledger package and an outstanding buy. If you need a general ledger program and have some knowledge of accounting, you will be extremely pleased with it.

Small Business Accounting Package

What it may lack in detail as compared to the *DDE* program, *SBAP* makes up for it in breadth. This fine offering from Color Software Services has accounts payable and receivable, a payroll account module, and sales entry. Those very familiar with accounting procedures may find some of its features a bit different, but *SBAP* is really just making things easier for the user.

By way of explaination, when entering sales, *SBAP* gives you the option of breaking down a day's receipts into cash sales, credit sales and sales on account (more on this later). If you have sales on account, it sends you to the accounts receivable section of the program to record the sale(s) made on account.

Yet, the program provides no way to *increase* a particular account balance. It *does* allow you to record a payment—but not an addition to the account. That seems to fly in the face of accounting procedures.

Maybe so. But it is also a very logical way to do business, too. Let's just say that John Doe buys $100 worth of goods from you on January 5th. That is easy to handle, you just record his purchase with the sales, go to the receivables module and open an account for Mr. Doe, with a balance owing of $100.

But, 10 days later, on January 15th, Mr. Doe is in with another order—this one for $200. You have to set up a second account for him, this time with a balance of $200.

Now, if this seems to be strange, remember that Mr. Doe will probably pay off the $100 before he pays off the $200. By handling each transaction (order, in this case) separately, you know which particular order Mr. Doe is paying off and which one is still open. That may not be the way a "professional" accountant would do it, but it *does* make excellent sense in the operation of a small business. Since your balance sheet will list your total receivables anyway, it is probably more important for the small businessman to know which outstanding invoice has not been paid using this method than it is to bundle all transactions to a particular individual and company up into one account.

This is particularly true because *SBAP* also provides some very nice aging reports—for both receivables and payables. If you shipped merchandise to Mr. Doe on a 30 day account, and set up the payment date when you entered the transaction, the program will automatically show his account as being 30 days behind if you have not cleared that balance owing by that date. A very nice feature.

The same aging status is available, by the way, for your payables. That way you can keep track of the money that you owe.

Earlier we said we would have more to say about the sales entry. This module also allows you to figure in the sales tax you will owe and the discount you might have to pay (say for credit card sales) as each day's sales are reported. *SBAP* prompts you for this information—which means you have the option of entering it or not. We like this very much, as it gives a very clear picture of how much actual sales are in a given day—and eliminates the necessity of an adjusting entry either at the end of the month or on a daily basis.

SBAP also has a module which allows you to keep track of purchase orders. While this is non-interactive with the rest of the systems, it is a good way to keep up to date with what you have ordered. It is a good "tickler" file for items for which you are awaiting delivery.

A check register is also available, which prints out your checks in numerical order.

In short, *SBAP* is just that, a Small Business Accounting Package. It has a wealth of features and does not require you to have a knowledge of accounting procedures—although it will provide you with the standard accounting reports—balance sheet and income statement. It allows 400 accounts recievable and 400 payable and lets you disburse these between some 38 categories.

Both systems are disk-based. *DDE* requires 32K while SBAP runs in 16K or 32K. It also features a tape backup procedure.

The documentation on both programs is excellent and the lead the user through many more procedures than there is space to detail here. Both programs are menu-driven, have user error-trapping techniques and are user-friendly. *SBAP* does more prompting than does *DDE.*

DDE's reports are formatted better than are those of *SBAP*. This is natural, of course, since (1) you set up the formats yourself (although you can modify *SBAP*'s) and (2) the program is geared to operate primarily as a general ledger alone.

As to price: The only word we can say is that both are extremely attractive. We have seen packages costing far more (for other computers) that do a great deal less.

Depending on your needs and level of expertise, either *Small Business Accounting Package* or *Disk Double Entry* have to rate as top-flight buys.

(Small Business Accounting Package, Color Software Services, P.O. Box 1708, Dept. R, Greenville, TX 75401, $149.95 plus $2.25 s/h; manual alone $20)
(Disk Double Entry, Custom Software Engineering, 807 Minuteman Causeway, Cocoa Beach, FL 32931, $44.95 plus $1 s/h)

What's A Payable?

Here are some of the terms discussed in this review:

General Ledger—A system for keeping financial books which features "offsetting entries," usually called double-entry bookkeeping.

Accounts Payable—A series of accounts which shows who you owe.

Accounts Receivable—A series of accounts which shows who owes you.

Aging Reports—Keeping track of receivables and payables according to when they should be paid.

Income Statement—A report that shows where money comes from and where it went.

Balance Sheet—A listing of liabilities and assets.

TAKE A CLOSER LOOK
THERE'S SOMETHING For EVERYONE

SOFTWARE

CCM#3

by Charles Santee, Ed.D.

This program allows total communication for special persons and does this with only one joystick. Easy to use, and also recommended for young children; can help teach spelling and sentence structure. Excellent documentation.
32K EXT **$32.95**

BIGNUM

If you dislike seeing numbers like 1.23045 E 23, and wish you could have **all** the accurate digits instead, then BIGNUM is for you. Add, subtract, multiply, divide and raise BIG numbers to BIG powers and get totally accurate results. Even if you are satisfied with an approximation, without this program the Color Computer would return an "OV ERROR" with this problem: 34↑45. BIGNUM returns the entire 68 digit result! Accurate to 1,024 digits in 16K & about 3,068 digits with 32 RAM.
16K. **$9.95**

SKY-DEFENSE

Can you survive the first wave of attack? Or the next? Or the next? Only your joystick will ever know! Features horizontal flight in highres graphics, and fast-paced action. Machine language; joystick required. 16K. **$18.95**

THE WALL

Here is a 9 color joystick game that isn't another "Breakout" but a new idea. You are a brick shooting Bricks at the WALL to get the brick on the other side! (strange plot) This one's unique. Time limit on play. Joystick required.
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This full size, industrial grade keyboard unit is P.C. board mounted for trouble free operation and years of use. Mounted in an attractive aluminum case with a 19-key numeric pad, AUX-KEY comes with long cable for remote placement of your 80C. No soldering required for installation. Will not affect normal operation of the original keyboard. **$134.95**

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Kit includes 8 200 ns #4116 Factory Prime Chips, piggybacked sockets, SAM socket, and "32K" button to replace the 16K on your computer's case. Easy to remove. No soldering to computer. **$25.95**

64K RAM CHIPS

200 ns #4164 chip set will upgrade your "E" board easily. Factory Prime Chips. (Compare the price elsewhere!). . **$69.95**

Nanos Reference Cards

Model I BASIC & ASSEMBLER	$4.96
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Model II Commands & Utilities	3.95
Model III BASIC & ASSEMBLER	5.95
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Color BASIC & EXTENDED	4.95
POCKET BASIC	2.95
APPLE II & II+ BASIC	3.95
APPLE II & II+ BASIC & 6502	4.95
Z-80	4.95

Add $1.50 per software order and $2.00 per hardware order for postage and handling.

California residents add 6% Sales Tax.

QUASAR ANIMATIONS
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(619) 274-2202

Personal Uses...

You're Invited To Use This Handy Program

4K

By Bob Dooman

This program uses the printer to produce something quite practical—a birthday party invitation in its own mailer!

The invitation will print out on 8½ X 11 paper like a letter. You'll fold it so the name and addresses of the person you're inviting is on the outside, so no envelope is needed.

Let's look at the listing. The REM's in 9 to 12 tell you the CHR$ codes are for an Okidata Micro-80. You may have to change those to suit your printer.

Lines 30 to 50 ask for the name and age of the birthday child. That's because I have four. You can change that to a constant, but the child will probably like it better keying in his own name.

Lines 70 to 130 prompt for date, time, etc. A word of caution, remember our 80C treats commas(,) or colons (:) as delimiters in input data. In other words, anything after the comma wouldn't print. I found spaces between entries work fine. Example: Niles IL 60648. Of course, if you have Extended Color Basic, you can change the *INPUT* commands to *LINE INPUT. LINE INPUT* does accept commas, etc.

The input up to addressee is keyed in just once. Only the name and address of each person invited changes. So after each invitation is printed, line 340 does to 130 for the next name and address.

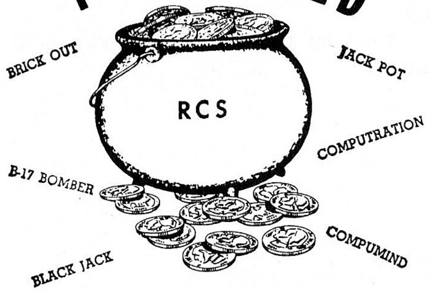
My four-year-old got a kick out of keying in things himself. So the program is fun, as well as educational and practical. Have a good party!

```
1 '***************************
2 '        BIRTHDAY PARTY      *
3 '          INVITATION
4 '              BY
5 '          BOB DOOMAN
6 '         GLENVIEW, IL      *
7 '          C. OCT 1982      *
8 '***************************
9 '80C WITH OKIDATA MICRO 80 *
10 'PRINTER CODE (10) @ 170,220,
230,330,350, = LINE FEED
11 'CODE (31) @ 180 = WIDE CHARA
CTERS FOR ENV ADDRESS
12 'CODE (30) @  210 = RESUME 10
 CHAR PER INCH
13 '****************************
20 CLS:PRINT"THIS WILL MAKE YOUR
":PRINT"BIRTHDAY INVITATIONS":PR
INT:PRINT"GIVE ME THE INFORMATIO
N":PRINT"I NEED":FOR X =1 TO 900
:NEXTX:CLS
30 PRINT"DO NOT USE COMMAS <,>":
INPUT"WHAT'S YOUR NAME";N$
40 PRINT
50 INPUT"HOW OLD WILL YOU BE";A
60 PRINT
70 INPUT"DATE OF PARTY";D$
80 PRINT
90 INPUT"TIME";T$
100 PRINT
110 INPUT"PLACE";P$
120 PRINT
130 CLS:PRINT"OK, I GOT ALL THAT
.":PRINT:PRINT"NOW, WHO IS INVIT
ED?":PRINT:INPUT"FIRST NAME";F$:
PRINT:INPUT"LAST NAME";L$
140 IF F$="" THEN 20 ELSE 150
150 PRINT:INPUT"THEIR ADDRESS";A
$
160 PRINT:INPUT"CITY ST ZIP";C$
170 FOR J=0 TO 8:PRINT#-2,CHR$(1
0):NEXT J
180 PRINT#-2,CHR$(31):PRINT#-2,T
AB(10)F$;" ";L$
190 PRINT#-2,TAB(10);A$
200 PRINT#-2,TAB(10)C$
210 PRINT#-2,CHR$(30)
220 FOR J=0 TO 14:PRINT#-2,CHR$(
10):NEXT J
230 PRINT#-2,TAB(5)"HI, "F$",":P
RINT#-2,CHR$(10):PRINT#-2,CHR$(1
0)
240 PRINT#-2,TAB(5)"I'm going to
 be "A" years old !!!!!"
250 GOSUB 350
260 PRINT#-2,TAB(5)"Can you come
 to my BIRTHDAY PARTY ?"
270 GOSUB 350
280 PRINT#-2,TAB(10)"DATE  ";D$:
GOSUB350
290 PRINT#-2,TAB(10)"TIME  ";T$:
GOSUB 350
300 PRINT#-2,TAB(10)"PLACE ";P$:
GOSUB 350
310 PRINT#-2,TAB(5)"Please call
my Mom to let her know:[INSERT Y
OUR PHONE NO]":GOSUB 350
320 PRINT#-2,TAB(5)N$
330 FOR J=0 TO 16:PRINT#-2,CHR$(
10):NEXT J
340 GOTO 130
350 PRINT#-2,CHR$(10):PRINT#-2,C
HR$(10):RETURN
360 END
```

05FA End

RAINBOW CONNECTION SOFTWARE presents...

POT O' GOLD



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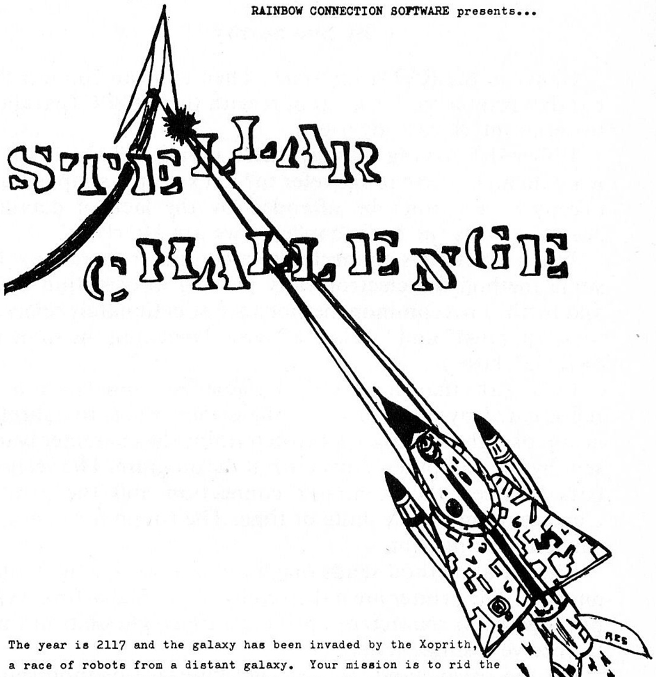

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CONQUEST OF KZIRGLA for the Color Computer

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OF
KZIRGLA

RAINBOW
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SEAL

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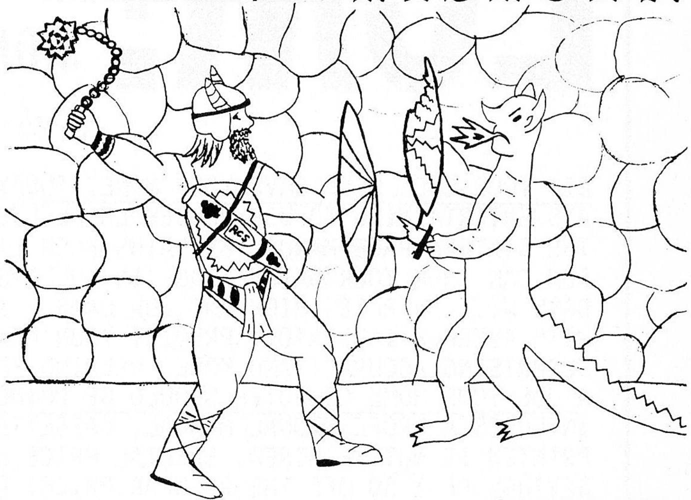

*Reviewed in the RAINBOW

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Hardware...

The Serial/Parallel Syndrome: What's That?

By Sue Searby

Okay, so the RS232 interface. Then you can connect the parallel printer to the serial port with the PK80C (parallel-to-serial interface converter.)

Jibberish? Asking why all these gyrations? Or at least, what do all of these terms refer to? Let's keep it simple, Sue! (Techy types, don't be offended by the lack of detailed accuracy. It is the basic concepts we are after!)

When a device is connected to a computer there must be some method for electronically passing information back and forth. Two common methods are affectionately referred to as "parallel" and "serial." ("Serial" meaning the same as "RS232" here.)

Let's say that a single character of information is represented by eight bits; i.e., the printer needs to collect a group of eight bits together to determine the character being sent by the computer. Now look at the diagram. The vertical bars between the computer connection and the printer connection mark off units of time. The round dots show a single bit being sent.

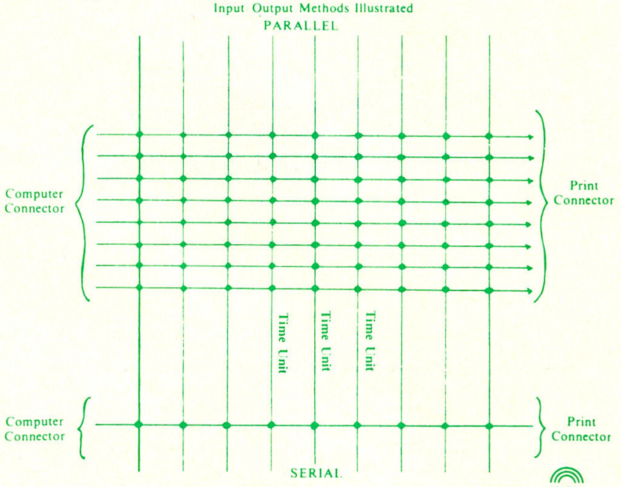
The serial method sends one bit at a time; one right after another. The printer must then collect eight bits before it can put together a character to print, waiting eight units of time to receive a single letter.

On the other hand, the parallel interface method sends eight bits all together at one time; i.e., eight bits are sent in parallel. Therefore, the printer receives a whole eight bits (one letter) each unit of time.

As you can see, a printer whose interface is electronically wired for receiving serial information could not understand a parallel signal from a computer and vice versa. These are simply two different methods of passing information from the computer to the printer—"serial" (one bit at a time), or parallel (a group at a time).

One last point of confusion. You may come across a printer with a parallel interface that is called a "serial" printer. This "serial" printer is one that prints out one character at a time—as opposed to a "line" printer that prints the entire line at once (used on larger computer systems).

Now, don't let the "serial/parallel" syndrome get you down again!



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  - Includes a utility to copy non-protected tapes to disk.
  - Note—ROM PAK execution requires good 64K RAM system.
  - Copy of article included describing how to access 64K RAM.

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  - Unleash the hidden 32K RAM in your 64K system.
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- **ROMKIL — BASIC ROM disable routine**
  - Your choice:
    - Disables DISK BASIC ROM—returning your system to EXTENDED BASIC, or
    - Disables EXTENDED BASIC ROM—returning your system COLOR BASIC.
  - Frees up extra RAM.
  - System stays in the level of BASIC you select even if you press the Reset switch.
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  - Make your TV a moving Marquee with Color BANNER!
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Hardware. . .

High Speed *POKE* Has Effect On CoCo Hardware

By Tony DiStefano
Rainbow Hardware Columnist

This is the first of a series of articles that will deal with the 'insides' of your Color Computer. Every month I will explore and explain different parts of the Radio Shack Color Computer hardware; its limitations, what it can do, what it cannot do, and how to improve it. In general, just digging into your computer and learning about the hardware that all that great software runs on.

In my first article I would like to clear up a controversy that has cropped up concerning the so-called *high speed* computer. As most people know, *POKE* 65495,0 speeds up Basic programs by about 65%. But why does it work on some computers and not on others? Also, why does it not work with most disk systems? There is also the *POKE* 65497,0. That seems to do some strange things on the screen. What does that do and why? Well, Here's the story!

All timings in the computer are derived from a 14.31818 mhz crystal. This frequency is the clock input to the 6883 (SAM) chip. When you power up, the Basic power up routine sets the SAM to divide the crystal frequency by 16, making the 6809E (MPU) frequency of .894 mhz clock rate. A write to $FFD7 ("$" denotes hex number) or *POKE* 65495,0 sets the SAM into what is known as the A.D. (Address Dependent) rate. This means that the MPU will work at one of two speeds .894 mhz or 1.788 mhz clock rates. This rate depends upon where the MPU is addressing. That's right! The SAM will switch between fast and slow clock rates depending where it is addressing memory. If the MPU is addressing memory between locations 0 and $7FFF (reading or writing) it will run at the slow clock rate. This area is usually RAM. That is 32K of RAM. When it addresses memory between $8000 and $FEFF it will run at the fast clock rate. This area of memory is usually occupied by Extended Basic, Basic, and DOS ROMS. I say usually because in another SAM mode this area could be RAM also. In the I/O (*input/output*) area, any addressing done between $FF00 and $FF1F is at slow clock speed. The rest of the I/O area between $FF20 and $FFFF is at fast speed. This means that only one of the PIAs go to high speed, and not both, like many people think. The PIA that does go to high speed is the one that does the D to A conversions and the VDG controls.

TRS-80 COLOR BASIC
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This entertaining self-instructional book is packed with games, experiments, scores of intriguing challenges, and activities related to fantasy role-playing games. The ideal introductory aid for kids, parents and teachers using the Color Computer.
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What does all this mean to you? Well, you can use this information to find out why your computer doesn't work at the dual or high speed. We'll start with the easiest and least expensive ways. First, if you have a disk drive, disconnect it and try to get the computer to work without it. If the high speed doesn't work without the drive plugged in you will have to open the computer. Turn the computer off before opening it. (P.S. Refer to your service manual for instructions before you attempt to open your computer. Oh! By the way, you may void your warranty by opening up the computer.) Now, remove the RF shield and locate the two capacitors labeled C73 and C75. These two capacitors along with resistors R73 and R74 make up a RF suppression circuit in the main clock circuit. This, unfortunately, distorts the square wave shape of the E and Q clock signals. This may prevent the system from working at the higher speed. OK, now make sure the compuer is off, and remember to make sure it's off before you do *any* modification.

Cut one side of both of these capacitors. Why only one side? Because you may want to resolder it if it has no effect on the high speed after you cut it. After all, it is a part of the RF suppression circuit. Turn the computer on and try the high speed. If it works, great; if not, you will have to continue. The next step is to check the PIAs. Since only one of the PIAs goes to high speed, the D to A and the VDG control one, try changing the PIAs around. The chance that both will not work at high speed is rare. If the other one works then you are on your way. If not, well, you will have to go one step further. At this point you may have to change some ICs. If you can, borrow rather than buy one two-mzh PIA (MC 68B21) and one two-mzh MPU (MC 68B09E) IC, because if after you have changed these two parts you may still be out of luck. Replace the MPU and the PIA with faster ones. Now it should work at the higher speed. If not, the only other components that you can change then are the Basic and Extended Basic ICs themselves.

With your computer working at high speeds it's time to try it with your Disk drive. What! It still doesn't work? Don't despair; I have another trick up my sleeve. There is one more capacitor to cut, it is labeled C85. This capacitor has the same purpose as the other two—RF suppression. Try the high speed with the Disk controller in. WOW! It works. But, if it should happen that your computer still doesn't work, the DOS ROM may not be fast enough.

Chances are your system will now work at the higher speed. If you still have problems after cutting these three capacitors and changing the PIA and MPU (which is very unlikely), there is not much more that you can do. Now that *POKE* 65495,0 works, what about *POKE* 65497,0? This is a mode in which the SAM will run at the high speed throughout the whole 64K of memory. Everything is in high speed, ROM, RAM, and all I/O. The reason that the screen goes haywire is that at that speed the SAM chip does not

YORK 10 BASF-DPS

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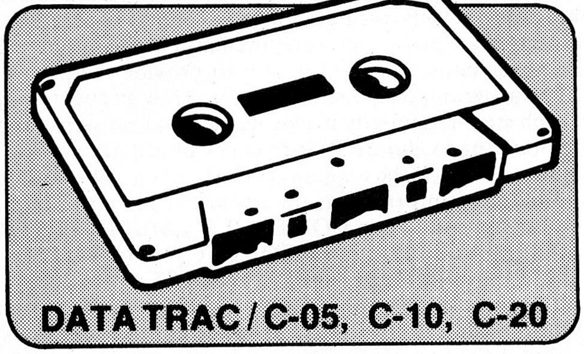

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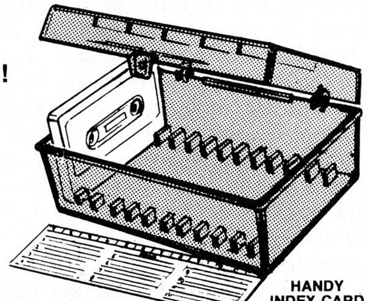

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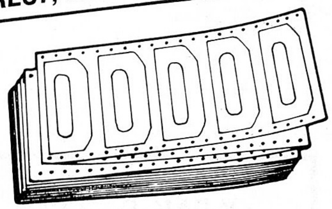

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☐ CHECK HERE FOR QUANTITY DISCOUNTS PRICE LIST have time to latch in the video, therefore the garbage on the screen. But if your RAM is fast enough, the computer can still work, even though the display makes you think otherwise. Here is a short test program to see if yours will work:

```
10 POKE 65497,0
20 FOR I = 1 to 500: NEXT I
30 POKE 65496,0
```

If this program comes back with OK on the screen, then your computer works at the DOUBLE SPEED. You can use this mode whenever there are a lot of calculations to do and there is no need for the video screen. Sound and keyboard functions should work OK, but do not try to do I/O in this mode. If it does not work, but works at the High Speed, then all you need is faster RAM. If you are using 4116 or 4164 chips make sure they are 150 nano seconds or faster. Well, that is all for now. Good luck with high speed. I'll see you next month.

Hint . . .

Painting Must Be Accurate

When you issue a PAINT command, be sure that you set the point at which the PAINTing is to begin within the area that is to be PAINTed. If you set the position on a line which encloses the area, the PAINT will not work.

Also, when using PAINT, be sure that your area is fully enclosed, or the PAINT will leak out and cover the entire screen.

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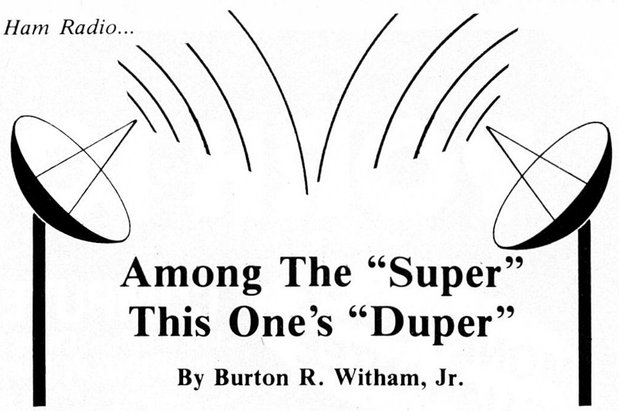

Among The "Super" This One's "Duper"

By Burton R. Witham, Jr.

After I had the automated log, "Logsheet" (*the Rainbow*-December '82), I perceived the need for a program to detect duplicate contacts during a contest. Not that I operate many contests these days, since I acquired my color computer! But one never knows, so I went to it to provide the program.

The program itself is straight forward, with cues for input at each step. Essentially it accepts a station callsign—allows the operator to choose to dupe check or not, then to log the contact or not. If the logging is opted, the cues then call for a minimum of information for contest reporting. The final contest log will show: CONTACT NUMBER, STATION CALL, DATE, TIME, FREQUENCY, and NOTES (for NAME/SIGNATURE, REPORTS, ETC.)

If a contact is found, and is a duplicate, the program indicates when and on what band the contact was worked, so that if the operator wishes, and contest rules permit, the station can be worked again.

Some of the features of the program are: to permit duplicate contacts on demand (as stated above), a "ZZ" feature to end data input phase, and a "**" command to screen the last 15 contacts made. After the contest is over, a copy of the log can be printed out to submit as a contest log (just sign it, and mail it). Of course, the information contained and the printout format can be changed to meet the needs of any particular contest rules.

The tape file was used for logging since the file was to be sequential, and with the short data input segments, the program returns to the input phase very quickly after data save. Again, if disk is desired, the modification of lines 140, 320, 330, 350, 400, 440, 460, 530 and 570 should be made.

All in all, this program satisfies my need for a contest logger/duper. As written it uses about 4K of memory.

The listing:

4K

0B98 End

```
10 '************
11 '* HAM RADIO
12 '*  CONTEST
13 '*   DUPER
14 '* BY: W4CNZ
15 '* B.B.WITHAM
16 '*   3501
17 '*SEA GULL RD
18 '*  VIRGINIA
19 '* BEACH, VA.
20 '*   23452
21 '*804-3402628
22 '* ALL RIGHTS
23 '*  RESERVED
24 '************
25 '* HEADER
100 DIMC(300),T(300),F(300),N(30
0):XX=63
```

```
110 CLS3:FORX=1024 TO1055:POKEX,
XX:POKEX+480,XX:NEXTX:FORX=1024
TO1535STEP32:POKEX,XX:POKEX-1,XX
:NEXTX:PRINT@170," D U P E R ";
120 FORTM=1 TO1000:NEXTTM:SOUND2
30,2:PRINT@388," BY:BURT WITHAM
 -W4CNZ ";:PRINT@422," VIRGINIA
BEACH,VA. ";:PRINT@458," HIT ENT
ER ";:FORTM=1 TO1000:NEXT:SOUND1
80,1
130 A$=INKEY$:IFA$<>CHR$(13) THE
N130
140 CLS:SOUND180,1:PRINT@33,"PRI
OR TO START OF CONTEST HAVE  NEW
 TAPE IN RECORDER AND PRESS  <PL
AY> AND <RECORD> BUTTONS.":PRINT
" UNLESS YOU HAVE AN OLD TAPE TO
  LOAD JUST PRESS <PLAY>.":PRINT
@484,"PRESS <ENTER> WHEN READY."
;
150 IK$=INKEY$:IFIK$="" THEN150
160 IF IK$=CHR$(13) THEN170 ELSE
 140
165 '* SELECT PGM
170 SOUND230,2:CLS:PRINT@33,"FOR
 CONTEST LOG HIT (1)         FOR
 LOG RELOAD/PRINT HIT(2)      TO
EXIT PROGRAM HIT (3)":PRINT@449,
"CALL-'ZZ' ENDS ENTRY MODE
 CALL-'**' SCREENS 15 CONTACTS."
;
180 K$=INKEY$:IFK$=""THEN180
190 K=VAL(K$):ON K GOTO 200,400,
580
200 SOUND230,2:CLS:CLEAR900:G=13
6:H=137:N=0
205 '* INPUT DATA
210 FORX=1 TO300
220 PRINT@19,"LOG#:";:PRINTUSING
"**####.";X:PRINT@64,"CALL-":PRI
NT@449,"CALL-'ZZ' ENDS ENTRY MOD
E        CALL-'**' SCREENS 15 CON
TACTS";
230 POKEG,4:POKEH,69:LINEINPUTC$
(X):IFC$(X)="ZZ" THEN330
240 IFC$(X)="**" THEN600
250 CLS:PRINT@166,"DUPE CHECK Y/
N";
260 DC$=INKEY$:IFDC$=""THEN260
270 IFDC$="Y" THEN360
280 PRINT@198,"LOG IT Y/N.";
290 LG$=INKEY$:IFLG$=""THEN290
```

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CLOCK-With the ever increasing use of digital clocks, more and more young people are unpracticed in the use of the "ANALOG" clocks. You remember those, the ones with the hands. This program will attempt to teach the relationship between the two types of clocks.
REQUIRES 16K EXT. BASIC $14.95

SPELLING TEST is designed to give a standard oral spelling test using the audio track of the computer's tape recorder to dictate test words and sample sentences. Student responses are typed on the keyboard and checked by the computer. Results are displayed on the screen and (if connected) on a printer. **REQUIRES 16K EXT. BASIC $19.95**

MATH DRILL is a program designed to help children to practice addition, subtraction, multiplication, and division skills on the COLOR COMPUTER. It has several features that make its use particularly attractive.
- Up to 6 students may use the program at the same time.
- Answers for addition, subtraction and multiplication are entered from right to left, just as they are written on paper.
- Commas may be included in the answers.
- Partial products for the multiplication problems may be computed on the screen.
- Division answers that have a remainder are entered as a whole number followed by the letter "R" and the remainder.
- There are ten, user modifiable, skill levels.
- A "SMILEY FACE" is used for motivation and reward. Its size increases relative to the skill level.
- Skill levels automatically adjust to the student's ability.
- A timer measures the time used to answer each problem and the total time used for a series of problems.
- After a problem has been answered incorrectly the correct answer appears under (above in division) the incorrect answer.

REQUIRES 16K EXT BASIC $19.95

WORD DRILL is designed to give a multiple choice vocabulary quiz. Words and definitions are entered into the program from the keyboard or from a tape file. The computer displays a randomly chosen definition and eight word choices. The student must enter his response before a built in timer reaches zero.
REQUIRES 16K EXT. BASIC $19.95

EDUCATIONAL PACKAGE — SPELLING TEST — WORD DRILL — MATH DRILL — ESTIMATE — ALL FOR — $69.95

ESTIMATE is a program designed to help children to practice estimating the answers to addition, subtraction, multiplication and division problems on the COLOR COMPUTER. It has many features that make its use particularly attractive:
- Up to 5 students may use the program at the same time.
- There are 5, user modifiable, skill levels.
- The acceptable percent error may be changed as a student's skill improves.
- A timer measures the number of seconds used to answer each problem and the total time used for a series of problems.
- If a problem has been answered incorrectly, the student is told the percent error and asked to try again.
- If a problem is answered incorrectly a second time, the student is told the correct answer and the range of acceptable answers is displayed.
- A report is given at the end of each set of problems that includes the number of problems done, the number of problems answered correctly on the first try and the average percent error.
- The (BREAK) key has been disabled so that a child will not inadvertently stop the program from running.

16K EXT. BASIC $19.95

TEACHERS' DATABASE is a program designed to allow a teacher to keep a computerized file of information about his/her students. There are many features that make this program particularly attractive.
- Information on as many as 100 students (or more) may be in the computer at one time.
- Each student may have as many as 20 (or more) individual items of data in his/her record.
- The program will run from cassette or disk.
- Cassette and disk files are completely compatable.
- The program is menu driven.
- Records may be easily changed, deleted, combined or added.
- Information about students may be numerical or text.
- Records may be quickly alphabetized.
- Records may be sorted by various criteria.
- Records may be reordered (ranked) based on test scores or other data.
- Data displayed during a sort may be printed on a printer or saved on disk or cassette as a new file.
- A full statistical analysis of data may be done and sent to the printer.
- Student test scores may be weighted.

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```
300 IFLG$<>"Y" THENCLS:N=N+1:NEX
TX
310 CLS:PRINT@19,"LOG#:";:PRINTU
SING"**####.";X:PRINT@64,"CALL-"
;C$(X):PRINT@78,"TIME-":POKEH,83
:LINEINPUTT$(X):PRINT@96,"FREQ-"
:PRINT@107,"NOTES-":POKEH,101:LI
NEINPUTF$(X):PRINT@107,"NOTES-":
POKEH,113:LINEINPUTN$(X):IFX>1 T
HEN GOTO330
315 '* SAVE DATA
320 OPEN"O",#-1,"CONTEST"
330 PRINT#-1,C$(X),T$(X),F$(X),N
$(X)
340 IFC$(X)="**" THEN600 ELSEIFC
$(X)="ZZ" THEN350 ELSE N=N+1:CLS
:NEXTX
350 CLOSE#-1:GOTO170
355 '* DUPE CHCK
360 FORN=1 TOX-1
370 IFC$(X)=C$(N) THEN 390 ELSE
NEXTN
380 SOUND230,2:PRINT@166,"NOT A
DUPE":FORTM=1 TO500:NEXTTM:GOTO2
80
390 PRINT@166,"DUPE!!":SOUND50,6
:PRINT@64,"CALL-";C$(N):PRINT@78
,"TIME-";T$(N):PRINT@96,"FREQ-";
F$(N):FORTM=1 TO1600:NEXTTM:CLS:
N=N-1:GOTO220
```

```
395 '* LOAD TAPE
400 CLS:OPEN"I",#-1,"CONTEST"
410 PRINT@33,"REVIEW OR PRINT OU
T 1,2";R$
420 R$=INKEY$:IFR$="" THEN420
425 '* REVIEW
430 IFR$="1" THEN440 ELSE 500
440 FORV=1 TON:LINEINPUT#-1,C$(V
):LINEINPUT#-1,T$(V):LINEINPUT#-
1,F$(V):LINEINPUT#-1,N$(V)
450 PRINT@32,"CALL-";C$(V);" TIM
E-";T$(V);" FREQ-";F$(V):PRINT"N
OTES-";N$(V):PRINT@486,"NEXT CAL
L <ENTER>";
460 IF EOF(-1) THENCLOSE#-1:GOTO
490
470 IK$=INKEY$:IFIK$="" THEN470
480 IFIK$=CHR$(13) THENNEXTV:GOT
O440
490 FORTM=1 TO1600:NEXTTM:GOTO17
0
495 '* PRINT FILE
500 CLS:PRINT@161,"PRINTER READY
 HIT <ENTER>";
510 R$=INKEY$:IFR$="" THEN510
520 IFR$=CHR$(13) THEN530
530 FORV=1 TON:LINEINPUT#-1,C$(V
):LINEINPUT#-1,T$(V):LINEINPUT#-
1,F$(V):LINEINPUT#-1,N$(V)
540 PRINT#-2,"CALL-";C$(V);TAB(1
8)"TIME-";T$(V);TAB(32)"FREQ-";F
$(V);TAB(50)"NOTES-";N$(V)
550 IF EOF(-1) THEN 570
560 PRINT#-2:NEXTV:GOTO530
570 FORTM=1 TO4:SOUND200,1:SOUND
180,1:NEXTTM:CLOSE#-1:GOTO170
580 '* EXIT
590 CLS:PRINT@174,"END":FORTM=1
TO999:NEXT:CLS:END
595 '* SCREEN 15
600 CLS:IFX>15 THEN620
610 FORZ=1 TOX:PRINTC$(Z);TAB(8)
T$(Z);TAB(14)F$(Z);TAB(18)N$(Z):
NEXTZ:GOTO630
620 FORZ=(X-15) TOX:PRINTC$(Z);T
AB(8)T$(Z);TAB(14)F$(Z);TAB(18)N
$(Z):NEXTZ
630 A$=INKEY$:IFA$<>CHR$(13) THE
N630 ELSECLS:GOTO220
```

Hint. . .

You can double the speed at which CoCo operates with a simple POKE statement, entered either directly from the keyboard or within a program. The statement is POKE 65495,0. This will speed up your CPU. You can return the computer to its normal speed again by POKE 65494,0.

START

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● Retain the sequence of commands in temporary memory with special reserved key	● **Retype** lost lines!
● One keypush and the right side of the keyboard converts to a numeric Keypad	● **Stretch** those fingers!
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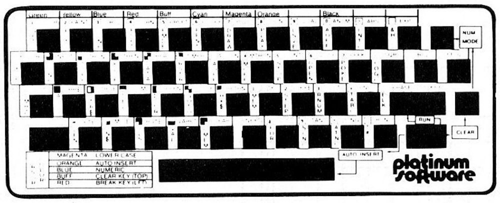

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---

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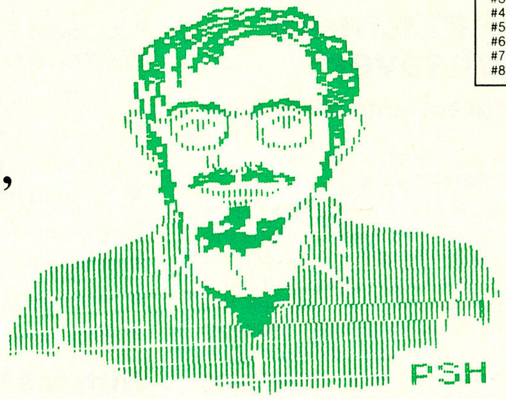
#1	95BE	End
#2	01F5	End
#3	01A4	End
#4	0257	End
#5	01DF	End
#6	029D	End
#7	020A	End
#8	00B6	End

The Expressive, Expeditious, Exhilarating X-Pad!

by Paul S. Hoffman

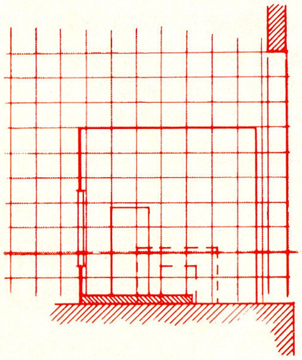


Shortly after purchasing my Extended Basic Color Computer, I started exploring ways in which I could expand its already marvelous graphics capabilities. One major question was, "What about other ways of entering information into the computer?" I could write programs to have CoCo ask me for X and Y coordinates; I could have it transfer joystick coordinates to the screen; but what if I wanted to quickly duplicate a piece of flat artwork? I obviously needed some sort of digitizer. (A digitizer is any piece of hardware which converts a hunk of the real world into numeric information.)

I knew of graphics tablets from demonstrations I had seen of some sophisticated graphics software on an Apple. But the least expensive tablet available cost $700.00 and was also in kit form: assemble it yourself! There was also no indication that I would be able to interface it properly with my Color Computer. Why not get Radio Shack's Digitizer (model 26-1195) for $449.00? Well, this was about 10 months before that product was announced, and even so, the price tag still seemed high. The product is also not specifically matched to the unique qualities of the 80C.

Enter the X-Pad! (Wouldn't "X-Y Pad" be a more accurate name?) This is a full-fledged graphics tablet designed specifically for the Color Computer, and comes with an appropriate price tag -- $350.00, one-half the lowest price I could find elsewhere! I ordered mine as soon as I had even an inkling that the product would soon exist!

Briefly, I am more than pleased with my X-Pad: it's fantastic! Biggest disappointment: lack of good software support and some extremely touchy potentiometer adjustments.



So, what exactly did I get for my $350.00? A silver-grey plastic box, 10½" by 13" by ½" thick, with two cords coming out of one side. One cord goes to a controller pack indentical in size and shape to a TRS-80 Color Disk Controller. The other cord leads to a pen. An 8½" by 11" area in the center of the silver-grey box is recessed slightly to hold a standard piece of typing/writing/drawing paper. The box itself contains a rectangular grid which acts as a receiving antenna for signals sent by a transmitter in the pen. The received signal is decoded into an X-value and a Y-value. The grid network matches precisely the 256 by 192 Pixel coordinates of the Color Computer's high resolution screen. In addition to the transmitter in the pen, there is a spring-loaded switch which triggers if the pen point is pressed down on a surface. The writing implement is a ball-point pen, which is refillable (it uses a Fisher Space Pen refill).

The hardware is really quite simple, and designed to be extremely easy to use if you can handle a little bit of programming. Three signals are sent to the computer: X-value, Y-value, and Pen Status. They are stored in three memory locations reserved by the SAM-chip for "future control registers or special I/O," 65376 (X), 65377 (Y), and 65378 (S or Status). The X and Y locations can store a number from 0 to 255. This obviously makes sense for the X-value; Y numbers beyond 191 represent positions outside the "drawing" area of the pad. The first four bits of the Status byte each have a different meaning. Together, they can represent a number from zero to 15.

Bit 0 = Pen Down

Bit 1 = Proximity (pen within receiving range of the pad)

Bit 2 = X-Margin (pen off to the left or right of the drawing area)

Bit 3 = Y-Margin (pen off above the drawing area -- top of screen)

In practice, the computer is constantly updating all three values (X,Y and Status), until you read them. As soon as you "PEEK(65376)," the other two values are held where they are (so you can get an accurate X,Y reading). Status may be read by itself at any time, however, so you can look for a particular pen position before checking X and Y.

Now then, what can you do with all this? Just about anything you can imagine, if you can work out the necessary program! As I indicated earlier, the biggest drawback to the X-Pad is the lack of sophisticated (or even well-structured) software support. Part of the problem seems to be the inherent flexibility of the machine -- what kind of program do you provide so that the X-Pad will do all things for all people? Early models of the X-Pad came with programming examples in the instruction book, but no demonstrations on cassette. There is now a free cassette with a demo program on it (#700-2114) which should be supplied to every owner.

By far, the hardest part of programming for the X-Pad is setting-up and reading a menu. Border areas around the active drawing area on your paper can be used as a selection-menu for various commands or values. The actual active

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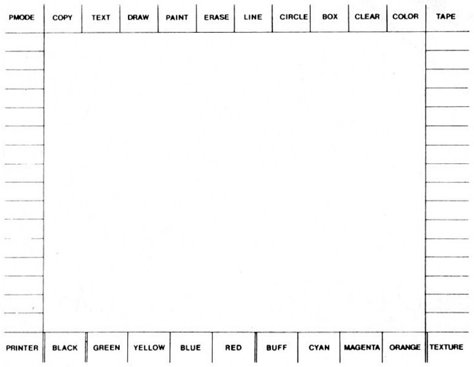
RAINBOW CERTIFICATION SEAL

area is 7″ high by 9″ wide. This leaves approximately ¾″ top and bottom and 1″ on each side for menu space. A coloful cardboard menu is provided with the X-Pad, with commands which match the demonstration program on the cassette. I found two drawbacks to this menu: the surface is not plasticized, and quickly gets lots of pen marks on it; and the Pad had trouble reading the pen signal through the thickness of cardboard. You'd be much better off creating your own menu area on a sheet of drawing paper. I drew up a black menu sheet and had a ream of paper printed-up at a local quick-print shop, as well as doing a ream of the specialized menu which matches my basic program. (See the accompanying sample.)

A big disadvantage to Tandy's demonstration program is that it is a supreme example of UN-structured programming! Tracing the program's flow (in order to learn from it or make changes) is a real nightmare. The accompanying listings, if you work your way through them, should give you a much better handle on how to get the most out of your X-Pad, while building a structured program in the process.



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LISTING 1 sets up the beginning of a menu program. Initially, it will allow you to DRAW in Orange lines on a Buff screen, or CLEAR the screen to Buff. Notice that the program is completely organized in subroutines. The main loop, which will change very little as we add functions, is lines 20 through 50. Lines 5 and 10 initialize the basic graphics values (PMODE, COLOR, SCREEN). These are referred to through variables so that we can change them later in the program. The first major subroutine used is at line 600. Here, we get the current X-Pad values. This routine can also be entered at line 610 to update only the status byte. In line 30, the S (Status) value is incremented because we intend to use "ON S GOSUB," which would generate an error if S were equal to 0. Line 45 allows us to change the display page through hitting the appropriate key on the keyboard.

The central routine to look at in this listing is from lines 400 through 440 -- this is where we read the top menu area. The program goes to this routine only if the pen is down in the upper menu area -- i.e. you select a function by pressing the pen in one of the upper boxes. The computer then waits until you lift the pen, and then checks the X-coordinate of your location. A variable called "MENU" is set based on which box you're in (MENU=X.width of one box). To let you know that your command has been properly received, a tone is sounded. Then you're sent to the appropriate subroutine.

NOTE: THIS PROGRAM IS WRITTEN TO WORK WITH THE ACCOMPANYING MENU, NOT WITH THE MENU CARD SUPPLIED BY RADIO SHACK.

Listing 1

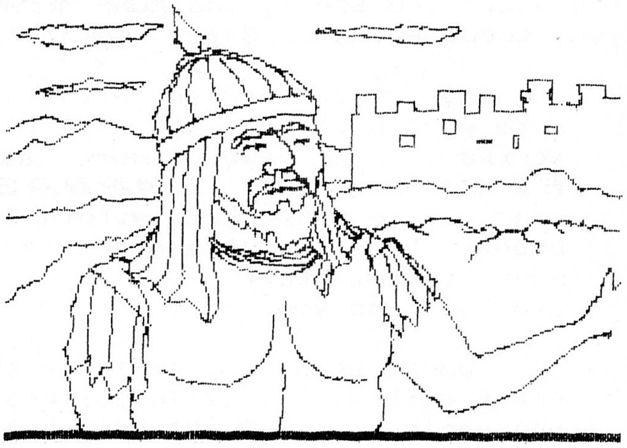
```
5 M=3:P=1:FG=8:BG=5:SC=1
10 PMODE M,P : COLOR FG,BG :PCLS
   : SCREEN 1,SC
15 '****************************
      BEGINNING OF MAIN LOOP
   ****************************
20 GOSUB600
30 S=S+1
40 ON S GOSUB 80,80,100,200,80,
   80,80,80,80,80,80,400,80,80,
  80,80
45 A$=INKEY$ : IF A$>"0" AND
   A$<"5" THEN P=VAL(A$) :
   PLAY A$ : PMODE M,P :
   SCREEN 1,SC
50 GOTO 20
60 '****************************
         END OF MAIN LOOP
   ****************************
70 '**BEGINNING OF SUB-ROUTINES
80 RETURN: 'NO ACTION
90 '**PEN CLOSE TO PAD -- FLASH
      CURSOR!
100 GOSUB600:'READ CO-ORDINATES
110 PS=PPOINT(X,Y)
120 FOR CU=0 TO 8 : PSET(X,Y,CU)
    : NEXT
130 PSET(X,Y,PS)
140 RETURN
```

```
190 '*TOUCHING DRAWING SURFACE**
    **GO TO PROPER SUBROUTINE**
200 ON MENU GOSUB 80,80,1300,
    80,80,80,80,80,80,80
210 RETURN
390 '***READ TOP MENU AND*****
    *SET THE APPROPRIATE FLAG*
400 GOSUB 610 : IF (S AND 1)=1
    THEN 400 : 'WAIT FOR PEN UP
410 MENU=INT(X/25.6)+1: 'MAXIMUM
    X-VALUE (256) DIVIDED BY THE
    NUMBER OF SPACES IN THE TOP
    MENU (10)
420 PLAY STR$(MENU) : 'LETS YOU
    KNOW THAT YOU'VE SELECTED A
    MENU ITEM.
430 ON MENU GOSUB 80,80,1300,80,
    80,80,80,80,1900,80
440 RETURN
590 '***READ THE X-PAD ****
600 X=PEEK(65376):Y=PEEK(65377)
610 S=PEEK(65378)
620 RETURN
1290 '*****DRAWING MODE********
1300 GOSUB 100
1310 GOSUB 610 : IF S<>3 THEN
     RETURN
1320 PSET(X,Y,FG)
1330 GOSUB 610 : IF S<>3 THEN
     RETURN
1340 XX=X : YY=Y : GOSUB 600
1350 LINE(XX,YY)-(X,Y),PSET
1360 GOTO 1330
1890 '*****CLEAR SCREEN********
     **TO BACKGROUND COLOR*****
1900 PCLS(BG)
1910 RETURN
```

Once you've explored the sketching possibilities, expand the program by adding LISTING 2. This involves a change in step 430, and the addition of lines 1990 to 2130. What you've added is the ability to select foreground and background colors. Press "COLOR" on the top menu and then TWO different color selections in the bottom menu, one for foreground, the second for background. Now if you press "CLEAR" the screen will clear to your new background color.

Listing 2

```
430 ON MENU GOSUB 80,80,1300,80,
    80,80,80,80,1900,2000
1990 '***SET FOREGROUND AND***
     ****BACKGROUND COLORS****
2000 GOSUB 610 : IF (S AND 1)=1
     THEN 2000 :'WAIT FOR PEN UP
2010 GOSUB 2100 : PLAY STR$(C+1)
2020 FG=C
2030 GOSUB 2100 : PLAY STR$(C+1)
2040 BG=C : IF BG>4 OR FG>4 THEN
     SC=1 ELSE SC=0
2045 SCREEN 1,SC
2050 COLOR FG,BG
2060 RETURN
2090 '**BOTTOM MENU SELECTION**
2100 GOSUB 600 : IF S<>3 THEN
     2100 :'WAIT FOR PEN DOWN ON
     DRAWING SURFACE OR BOTTOM
     MARGIN
2110 IF Y<192 OR Y>200 THEN 2100
2120 C=INT(X/28.334) : '256/9
2130 RETURN
```



LISTING 3 adds "PAINT" and "ERASE" functions. With PAINT you will need to select two colors, as in COLOR. The first color is the painting color, the second is the border color which will limit the painting. Then you position your pen in an area to paint. When you press the pen down, the area will be painted. THIS FUNCTION STAYS ACTIVE UNTIL YOU SELECT ANOTHER MENU FUNCTION. In other words, you can keep painting areas the same color until you decide to change colors or functions. To get new paint colors, you need to re-press PAINT.

Listing 3

```
200 ON MENU GOSUB 80,80,1300,
    1450,1500,80,80,80,80,80
430 ON MENU GOSUB 80,80,1300,
    1400,1500,80,80,80,1900,2000
1390 '*******PAINT*************
1400 GOSUB 2100 : PLAY STR$(C+1)
1410 PC=C
1420 GOSUB 2100 : PLAY STR$(C+1)
1430 BC=C
1440 RETURN
1450 PAINT(X,Y),PC,BC
1460 RETURN
1490 '*******ERASE*************
1500 GOSUB 100 : GOSUB 610 : IF
     S<>3 THEN RETURN
1510 PSET(X,Y,BG)
1520 GOSUB 610 : IF S<>3 THEN
     RETURN
1530 XX=X : YY=Y : GOSUB 600
1540 LINE(XX,YY)-(X,Y),PRESET
1550 GOTO 1520
```

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This document was prepared using a ***TRS-80(TM) Color Computer,*** the ***Super "Color" Writer II,*** an ***Epson MX-80 Graftrax Plus (TM),*** and an ***NEC Spinwriter 3510 (TM)*** to illustrate the great flexibility in formatting allowed by the ***Super "Color" Writer II***.

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By Tim Nelson

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LISTING 4 adds LINES, CIRCLES, and BOXES. The core of these routines is the subroutine from lines 1805 to 1835. In this routine the cursor flashes until a point is selected, then the same thing for a second point. For LINE, the line will be drawn between the two selected points, using the current foreground color. For BOX, select the upper-left corner of the box position, then the lower-right corner. In drawing a CIRCLE, you first set the center position, then any point on the perimeter. Again, as in the other commands, the function will stay active until a new menu selection is made.

Listing 4

```
200 ON MENU GOSUB 80,80,1300,
    1450,1500,1600,1700,1800,80,
    80
430 ON MENU GOSUB 80,80,1300,
    1400,1500,1600,1700,1800,
    1900,2000
1590 '*******LINES*************
1600 GOSUB 1805
1630 LINE(XX,YY)-(X,Y),PSET
1640 RETURN
1690 '****DRAW CIRCLES*********
1700 GOSUB 1805
1750 PRESET(XX,YY)
1760 R=SQR(ABS(X-XX)^2+ABS(Y-YY)
^2)
1770 CIRCLE(XX,YY),R,FG
1780 RETURN
1790 '*****DRAW BOXES************
1800 GOSUB 1805 : GOTO1840
1805 GOSUB 100 : GOSUB 610 : IF
     S<>3 THEN 1805
1810 PSET(X,Y,FG) : XX=X : YY=Y
1815 GOSUB 610 : IF (S AND 1)=1
     THEN 1815
1820 GOSUB 100 : GOSUB 610 : IF
     S<>3 THEN 1820
1830 GOSUB 610 : IF (S AND 1)=1
     THEN 1830
1835 RETURN
1840 LINE(XX,YY)-(X,Y),PSET,B
1850 RETURN
```

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Now comes the gravy! (Or is it the stuffing?) LISTING 5 is for the COPY routine. In very sophisticated computer graphics systems, this is called a "PAINTBRUSH" function. It will allow you to "pick up" a section of the screen, and then "draw" with that image. You can, of course, simply plop the image back down somewhere for the purpose of repeating a motif, but the fun comes in the fascinating fat or fuzzy lines you can doodle with! After entering the listing, try this: select foreground and background COLORS, CLEAR the screen, then create a little squiggly doodle in one or two colors (using DRAW). Now select COPY. Position your cursor to the upper left of your squiggle, press down, then do the same at the lower right of the squiggle. You have just picked up the squiggle and can now draw with it wherever you press your pen. How'd we do it? The secret is in the use of the "OR" in the PUT command in line 1150.

Listing 5

```
7 DIM CO(15,15)
200 ON MENU GOSUB 1120,80,1300,
    1450,1500,1600,1700,1800,80,
    80
430 ON MENU GOSUB 1100,80,1300,
    1400,1500,1600,1700,1800,
    1900,2000
1090 '*********COPY*************
     **SETS UP PAINT BRUSHES***
1100 FG=0 : FL=0 : RETURN
1120 IF FG=1 THEN 1150 ELSE IF
     FL=1 THEN 1135
1125 GOSUB610 : IF (S AND 1)=1
     THEN 1125
1130 AX=X : AY=Y : FL=1 : RETURN
1135 GOSUB610 : IF (S AND 1)=1
     THEN 1135
1140 BX=X : BY=Y : GET(AX,AY)-(B
X,BY),CO,G : FG=1 : RETURN
1150 PUT(X,Y)-(X+BX-AX,Y+BY-AY),
     CO,OR : RETURN
```

If you're still with us after that bit of magic, type in LISTING 6 so you can play around with different PMODES and also save/load your creations to/from TAPE. As in the selection of page numbers in the main loop, you must type the number of the mode you want on the keyboard. I have tried using the left menu for inputting numeric information, but found that any slight misadjustment in the Y-circuit caused errors in differentiation between boxes. Both my X-Pad and the demo model in the local computer center are prone to getting out of adjustment in the Y direction -- so I felt it wise to avoid the need for precision in reading the side menus.

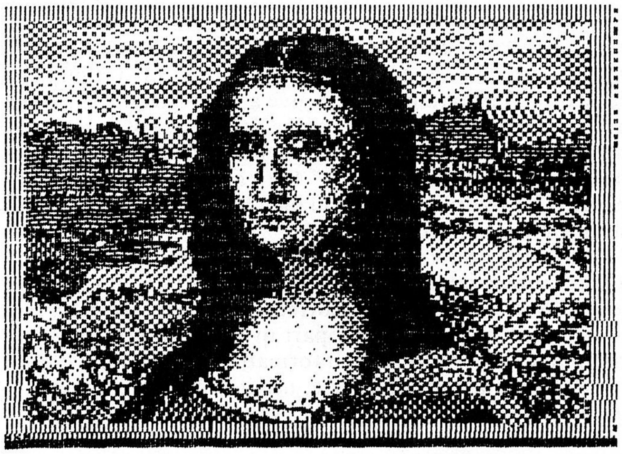
Listing 6

```
 40 ON S GOSUB  80,80,100,200,80,
     80,80,80,80,80,80,400,80,80,
    80,500
495 '******UPPER CORNERS*******
500 GOSUB 610 : IF (S AND 1)=1
    THEN 500 : 'WAIT FOR PEN UP
510 IF X<225 THEN 550 :'RIGHT
520 PLAY STR$(11)
530 M$=INKEY$ : IF M$="" THEN
    530 ELSE IF M$<"0" AND M$>
    "4" THEN 530
535 PLAY M$ : M=VAL(M$)
540 PMODE M,P : SCREEN 1,SC :
    RETURN
545 '******RIGHT CORNER********
550 PLAY STR$(12) : CLS : PRINT
    :PRINT "SAVE OR LOAD (S,L)?"
555 I$=INKEY$ : IF I$=""THEN 555
560 IF I$<>"S" AND I$<>"L" THEN
    SCREEN 1,SC : RETURN
565 PRINT : INPUT "FILE NAME";F$
570 PRINT : PRINT"POSITION TAPE
 - ANY KEY TO       CONTINUE -"
575 I$=INKEY$ : IF I$=""THEN 575
580 IF I$="S" THEN CSAVEM F$,
    1536,1535+6144,380 :
    SCREEN 1,SC : RETURN
585 SCREEN 1,SC : CLOADM F$ :
    RETURN
```

BUT, we don't want to ignore the existence of these side menus, so LISTING 7 will direct the computer to places in the program where you can insert your own routines. Left menu selection would be in lines 315 through 339, right menu in lines 350 through 444. In both cases, the item selected would be determined by the current Y-value. We need to loop through this area in order to access the lower corners, one of which is reserved for a call to your favorite screen dump routine. I personally use the other corner to call my adaptatin of the "TEXTURES" program by George Fraser from the June, 1982 issue of Tandy's *TRS-80 MICROCOMPUTER NEWS*.

Listing 7

```
40 ON S GOSUB  80,80,100,200,80,
    80,80,300,80,80,80,400,80,80,
    80,500
290 '******LEFT AND RIGHT******
    *******MENU SELECTION******
300 GOSUB 600 : IF S<>7 THEN 300
    : 'WAIT FOR PEN DOWN ON L OR
    R MARGIN
305 IF Y>192 THEN 450 : 'LOWER
    CORNERS
310 IF X<225 THEN 350 : 'RIGHT
    MENU
315 RETURN
340 '******RIGHT MENU*********
350 RETURN
445 '*****LOWER CORNERS********
450 IF X<25.6 THEN 700 : 'LOWER
    RIGHT CORNER
460 'INSERT HERE A CALL TO YOUR
    FAVORITE SCREEN DUMP ROUTINE
470 RETURN
690 '***LOWER RIGHT CORNER*****
700 RETURN
```



LISTING 8 simply fills out the program by accounting for one all-but-forgotten box in the upper menu, the one marked "TEXT." If you have 32K, you will have enough room left in memory to add a subroutine at 1200 to draw letters and numbers on the screen. Try using M.H. Endres' "Graphic Screen Character Set" from *the Rainbow*, May, 1982, or Ron VanDyke's "Hi-Res Character Generator" from *TRS-80 MICROCOMPUTER NEWS*, April, 1982.

On my 32K machine, I call the final program (with TEXTURE, PRINTER, and TEXT) "Superpad." This little combination of CoCo, X-Pad and the right programming makes a package which rivals almost any graphics system available for any micro out there.

One final note: If you have Tandy's MICROPAINTER cartridge, the pictures on the micropainter data tape and any pictures saved on tape from Micropainter are loadable and modifiable with this program, and VICE VERSA! My only criticism of Micropainter is that freehand drawing is extremely tedious (pixel by pixel). Try doing a line drawing with the X-Pad, saving it to tape, power down, insert Micropainter, load your saved picture, and PLAY AWAY!

Listing 8

```
200 ON MENU GOSUB 1120,1200,1300
     ,1450,1500,1600,1700,1800,80
     ,80
430 ON MENU GOSUB 1100,1200,1300
     ,1400,1500,1600,1700,1800,
     1900,2000
1190 '**DRAWING ALPHANUMERICS**
1200 RETURN
```

Education Notes...

4K

"User Friendly" Requires Friendly Users

By Steve Blyn
***Rainbow* Contributing Editor**

(Mr. Blyn, who teaches both exceptional and gifted children, holds two Master's degrees in the field of education and has won an award for the design of a computer program to aid handicapped children. He and his wife, Cheryl, own Computer Island.)

"User friendly" is the term that describes whether a program interacts in a social manner with its user. All educational programs should be as user friendly as practical. It is not wise to go overboard, however, even with something as good as "user friendly," as too much of a good thing can always become a turn-off. As a rule of thumb, all educational programs should give a nice, friendly greeting, and then ask for the player's name. In the case of a child, this not only gives the child a personal feeling about the program, but it also "alerts" the computer to the child's name. This useful information may be used again at various strategic times in the program.

Let's call the *INPUTted* name NN$. The computer may answer immediately with a "HELLO, NN$," or it may later tell NN$ if each answer is correct, or it may use NN$ in a report card or in any other part of the program. Once the computer picks up the information for NN$, it will remember and can, of course, use it until the computer is turned off, or another NN$ is *INPUTted.*

One large pitfall that may be encountered with this technique is the diversity of responses that may be *INPUTted* by children. There is no way of knowing beforehand the possible responses to the question—"What is your name?" You must be prepared to receive answers such as *Sue* or *Suzanne Angelina Washington* or even *Susie the Magnificent*. Each of these are real responses that I have received from the same child at different times. Surprise or unpredictable responses are normal when dealing with kids. Out of natural curiosity, children will often *INPUT* weird answers, merely to see the computer's reaction. There really is no problem with long, elegant responses except that they will mess up your carefully-designed video displays.

Let's consider the simple statement—*INPUT*"WHAT IS YOUR NAME";NN$. The semi-colon (;) indicates that the name will be printed on the same line as the question. This, however, only leaves 14 spaces for the name on that line. If the name does beyond 14 letters, the child will see his name split up in an inappropriate and unattractive manner. This would be unsound, both educationally aesthetically. The problem can become worse later on in the program in a circumstance such as—PRINT"CONGRATULATIONS";NN$;"YOU WIN." Unless the length of NN$ is known and controlled, the congratulations message may be broken up almost beyond recognition at the end of the line, and the user friendly intent will be completely lost.

There are two solutions to this problem. The first is to simply print NN$ on a new line every time it is used. This works well when the child is first asked to *INPUT* his name, but will not work well later on for the computer's messages to the child. Short names appearing alone on a line may seem as inappropriate as the extra long names.

A much better idea is to have the computer read the first ten or so letters of NN$ as a separate string "N$." Most first names do not exceed eight or nine letters. We will therefore have the computer create a more usable string called N$—N$=LEFT$(NN$,10). This will limit the video output of the name to the first ten letters. If the child's name is shorter, there will be no problem. If the name is longer, then only the first ten letters will be printed when the program formatting calls for it.

This program makes use of three *INPUTs* from the child to create an endless amount of stories about him, a friend, and his choice of any verb. Although the story line is very controlled, it does have much randomness included for variety. Lines 50-200 pick random words. You may, of course, change or increase the choices in your own version of this program. Lines 260 and 290 ask for the child's and a friend's name. Lines 270 and 300 convert possible long *INPUTs* to a controllable maximum of 10 letters. This is necessary to keep the story readable at all times. Line 320 asks for any verb to be *INPUT.* Lines 380-420 print out the actual story. If you have a printer, then create additional lines here using *PRINT #-2*, to give hard copy output as a bonus. Line 440 asks if you want another story. If the answer begins with a "Y" (some children are not content with a simple yes, but type "ya" or "yessiree"), then another story will immediately appear for additional reading practice, or enjoyment. An unlimited amount of stories can thus be created from the original three *INPUTs.*

After you feel comfortable with this program, try altering the story line to a new theme. Be careful to control the *INPUTs* by string manipulations to keep exactly the string lengths you want on each line. We at Computer Island look forward to hearing of your problems and successes.

The listing:

05E4 End

```
0 '**********************
10 'STORIES
20 'STEVE BLYN
30 'COMPUTER ISLAND,N.Y.
40 GOTO220
50 VB=RND(5):C=RND(3):J=RND(2)
60 IFVB=1THENVB$="DANCE":PL$="PA
RK"
70 IFVB=2THENVB$="SKIP":PL$="BEA
CH"
80 IFVB=3THENVB$="RUN":PL$="WOOD
S"
90 IFVB=4THENVB$="JUMP":PL$="STO
RE"
100 IFVB=5THENVB$="HOP":PL$="MOV
IES"
110 IFX=1THENX$=" PARK "
120 IFX=2THENX$=" BEACH "
130 IFX=3THENX$=" WOODS "
140 IFX=4THENX$=" STORE "
150 IFX=5THENX$=" MOVIES "
160 IFC=1THENC$=" MORNING."
170 IFC=2THENC$=" AFTERNOON."
180 IFC=3THENC$=" EVENING."
190 IF J=1THENT$="EARLY"
200 IF J=2 THEN T$="LATE"
210 RETURN
220 CLS8:PRINT:PRINT@76,"stories
";:FORX=0TO63:SET(X,7,7):SET(X,8
,7):NEXTX
230 PRINT@192,"  THIS IS A PROGR
```

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```
AM THAT LET'S      YOU HELP TO CR
EATE STORIES."
240 FORT=200TO230:SOUNDT,1:NEXT:
FORT=230TO200STEP-2:SOUNDT,1:NEX
T
250 PRINT@389,"PRESS ENTER TO GO
 ON";:INPUT H$
260 CLS:PRINT"       WHAT IS YOUR
NAME":INPUTNN$
270 N$=LEFT$(NN$,10)
280 GOSUB480
290 PRINT"  NAME ONE OF YOUR FRI
ENDS":INPUTAA$
300 A$=LEFT$(AA$,10)
310 GOSUB480
320 PRINT"  NAME AN ACTION WORD
THAT              ENDS IN 'ING'"
:INPUTO$
330 GOSUB480
340 CLS5:PRINT@0,"     HERE IS ";N
$;"'S STORY":FORT=1TO600:NEXTT
350 GOSUB50
360 FORT=1TO10:SOUND100,1:NEXTT
370 FORX=0TO63:SET(X,3,8):NEXT
380 PRINT@97,"IT WAS ";T$;" IN T
HE";C$:FOR T= 1 TO 600: NEXT T
390 PRINT@160,N$;" AND ";A$; " W
ERE":FOR T= 1 TO 600:NEXT T
400 PRINT@224,O$;" ON THEIR WAY
TO THE":FOR T= 1 TO 600: NEXT T
410 PRINT@288.PL$;". THEN THEY S
TARTED TO":FOR T= 1 TO 600: NEXT
 T
420 PRINT@352,VB$;" AND HAD A LO
T OF FUN."
430 FORT=1TO5:SOUND220,1:NEXT
440 PRINT@448,"do you want anoth
er story (Y/N)";:INPUT Q$
450 CLS:SOUND200,4:SOUND170,4:SO
UND150,4
460 IF LEFT$(Q$,1)="Y" THEN 340
470 PRINT"BYE FOR NOW":END
480 PRINT:PRINT"----------------
----------------";:FORT=100TO200
STEP5:SOUNDT,1:NEXT:RETURN
```

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Assembly Corner...

Let's End Those Typing Errors Once And For All

By Dennis S. Lewandowski
***Rainbow* Contributing Editor**

(Mr. Lewandowski, an experienced assembly language programmer and teacher, is president of DSL Computer Products.)

One of the biggest problems that face people who try to type in Basic language programs is the infamous *? SN ERROR*. Good old *? SN ERROR* occurs when you type in *PRENT* for *PRINT* or any of a number of other such things that make command words into something they are not.

Hey, let's face it. Typing these things in isn't exactly the easiest thing in the world! You are often confronted with a whole bunch of lines of code that simply boggle the mind. Typing these lines is slow and tedious. And the possibility for error is great.

And, who among us hasn't finished typing in a long, long listing of something we *really* wanted and then found out that it wouldn't run. Usually it's our fault! We just missed a line, typed a *FUR* for a FOR or, after answering the phone, forgot that there was an *ELSE A*=33 at the end of the line and just went on along.

I really wanted to give all of you a little Christmas present, but got all wound up in the graphics game we were constructing for last month. So, for January now, let's take a little time out to present this little utility, *RBOWCHEK*, that should solve a lot of your typing problems.

RBOWCHEK works on a principle called a *Checksum* that actually counts the number of characters in a Basic program. Because of the way Basic works, it does not actually count all the characters. Let me explain.

First of all, your CoCo pads in three zeros into a Basic program to help the Basic interpreter locate the start and end point. Two of those zeroes are counted by the Checksum, so they are also counted by *RBOWCHEK*. All that means is that if your computer is "empty"—doesn't have any program in it—you will get a reading of 2. That is because two of the zeroes are counted. It's not to worry.

Second, Basic *tokenizes* its command words. So, no matter how long they are, they count the same. After loading in *RBOWCHEK*, try typing in the following:

1 PRINT "HELLO"

Press the down arrow, and you will see the figure *0010* at the top left-hand corner of the screen. Now, just type in a 1 to clear out the line and type this line:

1 IF "HELLO"

Yes, I know this line doesn't make any sense, but press the down arrow anyway. As you will see, the same figure, *0020* appears again (or does not change) in the upper left-hand corner of the screen.

This is because Basic reads its tokens as essentially the same. Although *IF* is three letters shorter than *PRINT*, it is still read as the same.

How To Use RBOWCHEK

There are two versions of *RBOWCHEK* listed with this article. The first is a machine language program which you can directly type in and assemble with an editor/assembler. The second is a Basic program which will *POKE* the machine code into memory.

Note Line 2 in the Assembly Language listing. It sets the origin to $3FB0. That is for 16K machines. Those of you with 32K should change this origin to $7FB0.

The Basic program works a little easier. It reserves memory, checks for 16K or 32K (sorry, no 4K version) in Line 10. Line 20 clears memory for the routine (since executing a *CLEAR* resets all variables, Line 30 just repeats Line 10.

The Basic program is also built to trap errors by setting up its own error trapping for Checksum mistakes on the *DATA* statements. So, if you mistype one of the *DATA* statements, Line 70 should catch it.

The program is position independent, which means it can be loaded anywhere in memory. Before the Machine Language version of the program is loaded, you must *CLEAR 25, 16303* for 16K or *CLEAR 25, 32687* for 32K.

*EXEC*ute the program. Now, all you need to do is press the down arrow and the Checksum for your Basic program is shown on the screen.

This Checksum from *RBOWCHEK* is shown in hexadecimal numbers. To convert to decimal (if you wish to), just type in *PRINT &H####*. The screen will display the decimal equivalent of the hexadecimal number.

It is a good idea to *NEW* the Basic program out of memory at this point. Then start typing the program you want to load into memory. At the end of any line, simply press the down arrow and the Checksum for that program will appear on the screen.

Now The Good News

The good news is really good—a nice way to start out the year.

Beginning this month, all Basic programs of any size published in *the Rainbow* will have a count from *RBOWCHEK* published with them. Longer programs will have a couple of "benchmarks" so that you can check your progress along the way.

If you get a number different than the *RAINBOW CHEK*™ (a Trademark of Falsoft, Inc.), you will know you have made a typing error. Because the longer programs will have several *RAINBOW CHEKpoints*, you will be able to spot your errors more easily and quickly.

Now, a few hints:

1. Spaces count as a character, so be sure you follow the listings *exactly* as they appear in *the Rainbow*. All listings, as you know, are formatted to 32 characters, to match the CoCo screen.

2. This program will not distinguish between incorrect command words. So, if you mistype *PAINT* rather than *PRINT*, the *RAINBOW CHEK* will not alert you to the error.

3. By the same token (pardon the pun), if you mistype a variable there is no way for *RBOWCHEK* to catch it—

unless you type the variable *A* as *AA*. But, *RBOWCHEK* reads only the characters—it has no way to evaluate the letters.

Even with these three exceptions, *RBOWCHEK* should be a great help to you in typing in programs from *the Rainbow*. And, please note that while this program is copyrighted by *the Rainbow*, it is available to any other publication or program author simply by written permission.

We hope others will adopt this system, too, to make it easier to type in programs. Those wishing to use it need only write to *the RAINBOW*. Copyright and trademark identification should accompany any use. Please write Lonnie Falk, the editor of this magazine, for details.

So, we hope you will feel that incorporation of this little goodie is more than worth a slight departure from the *Assembly Corner*. We'll be back on track next month and we're looking forward to a lot of good offerings in 1983. Hope you'll be with us!

The Listings:

RBOWCHEK
Assembly Language Listing

```
0600                      NAM  RBOWCHEK
0600                      ORG  $3FB0           $7FB0 FOR 32K
3FB0 B6016A       START   LDA  $016A
3FB3 A78D0044             STA  RETURN,PCR
3FB7 867E                 LDA  #$7E
3FB9 B7016A               STA  $016A
3FBC BE016B               LDX  $016B
3FBF AF8D0039     VAR     STX RETURN+1,PCR
3FC3 308D0004             LEAX CHECK.PCR
3FC7 BF016B               STX $016B
3FCA 39                   RTS                BACK
3FCB 810A         CHECK   CMPA #$0A          DOWN ARW KEY
3FCD 262C                 BNE RETURN         NOT PRESSED
3FCF 3416                 PSHS X,D           SAVE REGISTERS
3FD1 DC1B                 LDD <$1B           TOP OF PRGM
3FD3 9319                 SUBD <$19          START OF PRGM
3FD5 8E0400               LDX #$400          START OF SCREEN
3FD8 8D06                 BSR HEXOUT         DISPLAY RESULT
3FDA 1F98                 TFR B,A            PUT B INTO A
3FDC 8D02                 BSR HEXOUT         DISPLAY RESULT
3FDE 2019                 BRA OUT            FINISHED
3FE0 3402         HEXOUT  PSHS A             SAVE CONTENTS
3FE2 44                   LSRA               TURN BYTE INTO
3FE3 44                   LSRA               NIBBLE
3FE4 44                   LSRA               "    "
3FE5 44                   LSRA               "    "
3FE6 8D04                 BSR OUTA1          SCREEN CORRECT
3FE8 3502                 PULS A             RESTORE CONTENTS
3FEA 840F                 ANDA #$0F          STRIP MSN
3FEC 8109         OUTA1   CMPA #$09          9 OR MORE?
3FEE 2E04                 BGT AF             MUST BE A-F
3FF0 8B70                 ADDA #$70          MUST BE 9 OR <
3FF2 2002                 BRA OX             SKIP ALPHA
3FF4 8B37         AF      ADDA #$37          ALPHA OFFSET
3FF6 A780         OX      STA ,X+            PRINT NUMBER
```

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```
0039 3FFC 0000             FDB 0          STORE ADRS HERE
0040 3FFE                  END  START
0036 3FF8 39               RTS            RETURN FROM SUB
0037 3FF9 3516      OUT    PULS X.D       RESTORE REGS
0038 3FFB 7E        RETURN FCB $7E        JUMP OPCODE
```

RBOWCHEK
Basic Listing

```
10 CLS:IFPEEK(116)=127 THEN X=32
688 ELSE X=16304
20 CLEAR25,X-1
30 IFPEEK(116)=127 THENX=32688 E
LSE X=16304
40 FORZ=X TO X+77
50 READY:W=W+Y:PRINTZ.Y;W
60 POKE Z,Y : NEXT
70 IFW=5718 THEN80 ELSE PRINT"DA
TA ERROR":STOP
80 EXEC X:END
90 DATA 182,1,106,167,141,0,68
100 DATA 134,126,183,1,106,190
110 DATA 1,107,175,141,0,57,48
120 DATA 141,0,4,191,1,107,57
130 DATA 129,10,38,44,52,22,220
140 DATA 27,147,25,142,4,0,141
150 DATA 6,31,152,141,2,32,25
160 DATA 52,2,68,68,68,68
170 DATA 141,4,53,2,132
180 DATA 15,129,9,46,4,139,112
190 DATA 32,2,139,55,167,128,57
200 DATA 53,22,126,0,0
```

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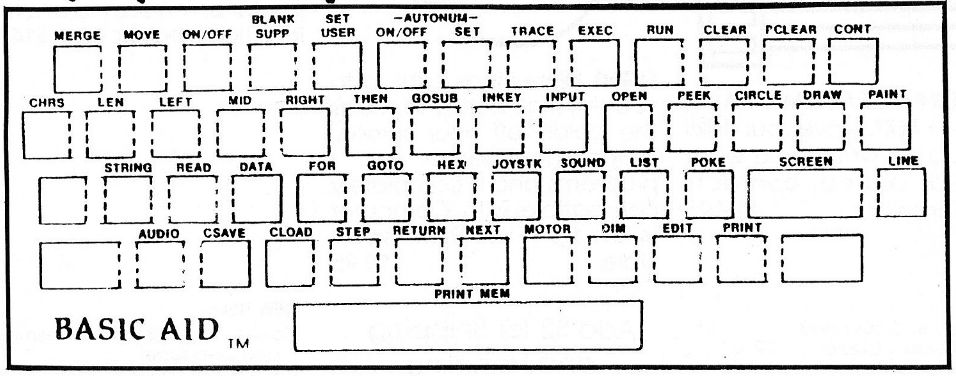
MERGE
MOVE
ON/OFF
BLANK SUPP
SET USER
-AUTONUM-
ON/OFF
SET
TRACE
EXEC
RUN
CLEAR
PCLEAR
CONT
CHRS
LEN
LEFT
MID
RIGHT
THEN
GOSUB
INKEY
INPUT
OPEN
PEEK
CIRCLE
DRAW
PAINT
STRING
READ
DATA
FOR
GOTO
HEX
JOYSTK
SOUND
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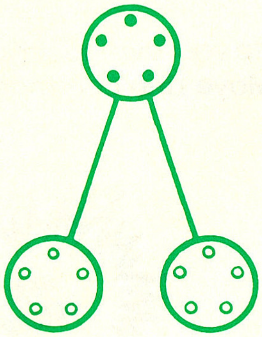

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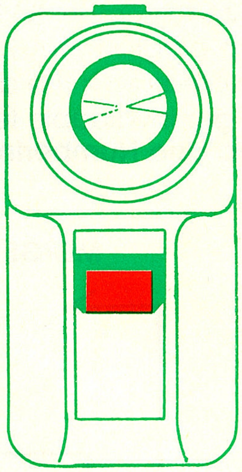

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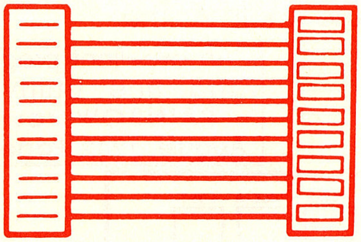

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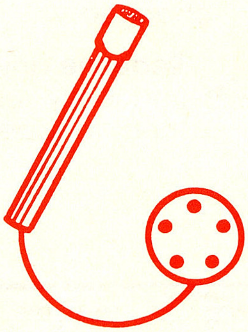

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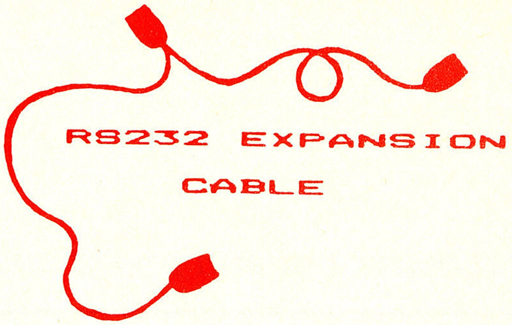

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Bob Rosen—A Colorful Success Story

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by Kerry Leichtman
80 Micro *Staff*

When forming an opinion of the Color Computer's success, it would be best to consider the story of Bob Rosen. Bob's claim to Color Computer fame is his bulletin board—Connection-80 of Woodhaven, NY. It is the only bulletin board exclusively serving the Color Computer.

It didn't start out that way. Bob began his bulletin board in March of 1981 on a Model I providing information on TRS-80 Models I and III. Then he bought a Color Computer. Bob's fascination with the Color Computer is similar to that of many other computerists. He was amazed by its power, ease and versatility.

"I was kind of surprised there was no support from Radio Shack—very little, like the Pocket Computer," Bob told *80 Micro*. "I started putting things on about the Color Computer and all of a sudden I was getting a lot of out-of-state calls.

"It just mushroomed; it's amazing. I can be here any time of the day and get a call from just about anywhere. I've gotten calls from England, Israel, Alaska, Puerto Rico, Canada, Mexico, Switzerland and all over the United States.

Bob was a Radio Shack employee for seven and a half years. He enjoyed working for Radio Shack and, apparently, Radio Shack liked employing Bob. For four straight years, as a retail salesman, he was their area's number one man behind the counter in total sales. Is running a bulletin board a profitable business? To leave behind the salary a number one salesman earns should lead to some positive conclusions.

To be a good salesman you have to believe in what you are selling. Bob was one of the first, if not the very first, New Yorker to buy a Model I TRS-80. His sales receipt is dated August 5, 1977. At the time he was attending New York City Community College as an electrical technology major.

"I was always fascinated by computers. One thing led to another. I met a gentleman by the name of Tom Vande-Stouwe of B.T. Enterprises at a computer user's group. He started what I believe was the first bulletin board service in the New York City area. He told me all you need is a Model I, two disk drives, an auto-answer modem and a software package. So I bought the package and set up my Model I. At the time it was mainly a hobby."

The package is called Message 80, written by Richard Taylor of Programs Unlimited with enhancements by Vande-Stouwe. It consists of a 1K machine-language driver program and a 15K Basic program. The bare-bones system requires a 32K micro and two disk drives.

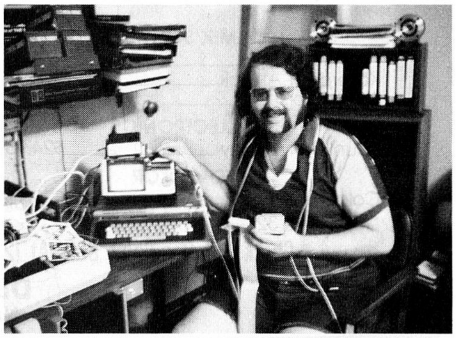
But let's back up a little more, to where Bob Rosen and the wonderful world of electronics collide. "It's all because of Roger Maris and Mickey Mantle," Bob confessed. (For the younger hobbyists: Maris and Mantle were not Radio Shack salesmen. They were the driving forces behind an almost unstoppable New York Yankee baseball team in the 1960s.)

"I was a sports fan. I was always a Yankee fan. I got intrigued by listening to the AM radio at night trying to pick up Yankee games when they were on the road. I got interested in that and started reading articles about short-wave listening. I got into short-wave DXing, I got my amateur radio license (K82HKO), and that got me into electronics."

Connection-80 has been in existence slightly more than one year. Some of its features are electronic mail, bulletins, downloading, a products section, a merchandise section, user log and chatting with the system operator—Bob Rosen. "If I'm around a caller can chat with me on line. Accessing the chat feature sends the control G to my MX-80 which sounds a little bell to get my attention."

Connection-80's hardware consists of three 80-track, double-headed drives and one 40-track, double-headed drive, a 48K Model III, an auto-answer modem and an MX-80 printer.

The bulletin board is accessed more for electronic mail than anything else. "What happens is a lot of people put on fixes, hints and general information that they have found out for themselves about the Color Computer that you can't get anywhere else. People go on the board asking for a solution to a problem, or something about a software bug.



Bob Rosen—one of the first TRS-80 purchasers with the Connection-80 hardware.

ADVERTISMENT

"When Bob Rosen dreams he sees a multi-user bulletin board with a toll-free 800 number, no errors and no disk or memory crashes."

"What we have here is a central point now where people can call in and reasonably get an answer, instead of calling Radio Shack's 800 number in Texas and getting, 'We don't know.'"

For users accessing Connection-80 for help, there is one aspect to Bob's service that might remind them of Radio Shack—a busy signal. At present Connection-80 can only handle one caller at a time. "If I get 40 callers a day, I might have had 200 attempts to get on." Corrective measures are in the works. "I have plans to go multi-user in the near future. Maybe I'll purchase a Model 16.

"I'm also looking at getting a 10-megabyte hard-disk system with DOSPLUS from MTI. The only reason I didn't have one before is that there wasn't any software for the Model III. Now there is."

Even with his one-caller-at-a-time limitation, Connection-80 is enjoying financial success and gaining itself a reputation as a Color Computer resource. "Color Computer gurus, such as Alfredo Santos, Cal Rasmussen, Syd Hahn, Wayne Day and Jorge Mir started calling Connection-80 with all kinds of Color Computer secrets not yet released by Radio Shack. For example, to speed up the CPU, all you have to type is a POKE 65495,0. Or to get 6K more memory, POKE 25,6:POKE 27,6:POKE 29,6:POKE 31,6."

To access Bob Rosen and Connection-80 users need a TRS-80, a full-duplex, 300-baud modem and the phone number: (212) 441-3755. There is no charge, other than what Ma Bell requires. To download from the system users need a ROM pack called ColorCom/E for $49.95, available either from Bob or Eigen Systems.

"If someone calls me from my same area, with the same message rate, they could be on 10 hours and it would only cost them eight cents. That's it."

Bob, through his company Spectrum Projects, runs the bulletin board full time He makes his living by mail order selling many of the products listed on the board's merchandising section and by selling advertising. Bob gets calls on a daily basis from businesses requesting space on Connection-80. With all this instantaneous success attributable to the Color Computer's popularity, Bob finds Radio Shack's slow-to-support attitude puzzling.

"It's still amazing to me that after all this Radio Shack still does not do anything. They say it's in the works. I can believe some of that, but I can remember waiting eight months to get Level II chips when I first got my Model I."

Connection-80's future looks bright. When Bob Rosen dreams he sees a multi-user bulletin board with a toll-free 800 number, no errors and no disk or memory crashes. And everyone who calls up will be able to access it. ■

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PIPELINE

WE DID IT AGAIN, and forgot to mention the name of our cover photographer/artist from the December issue. Now, let's say that we apologize to Craig Hannah of Los Angeles for forgetting to give him proper credit in the December issue. We hope you'll agree with us that Craig's picture of CoCo under the Christmas tree was a fitting one for our December issue.

But, *the Pipeline* is supposed to be a place for "inside" news, not apologies. So, we think the story of how that cover came to be might be of interest. Craig reports that most of his friends "find me a little crazy" because of the time he spends with his own CoCo. But, he said, the evening he actually took the photographs for the cover "it was 101 degrees in L.A. and no one could figure out why I wanted a Christmas tree. Then, when I turned up the air conditioning full blast and lit a fire in the fireplace, they *knew* there was something wrong with me!"

Never to mind, Craig. It was a beautiful cover.

WE UNDERSTAND THAT the earlier models of the TDP-100 may have some problem showing up with some of the proper colors in PMODE4. This, by the way, only happens when the program that is being run uses pseudocolors in PMODE4—as used by some of the high resolution arcade games.

There's a way to fix it, of course. Ron Krebs of Mark Data says that one of the ways is to add a 33K one-quarter watt five percent resistor between pins 2 and 12 of IC U6. The IC number is printed on the circuit board.

The other fix is a little more complicated. What you need to do is set up three components in a line: a 33K ohm resistor, a 75 Picofarad resistor and a 27 microhenry inductor. These should be hooked up between the emitter of transistor Q3 and IC U9, pin 33.

SOME OF THE NEW Radio Shack printers, the DMP-100 and the DMP-200, are reported to have a bit of trouble when being used with the 1.0 ROMs found in earlier versions of CoCo. The solution is a simple one: Get the 1.1 ROM. Radio Shack will replace your 1.0 ROM with a 1.1 ROM for free if you have a new printer and experience trouble.

SPEAKING OF PRINTERS, Radio Shack is out with a new daisy wheel model, the DWP-410, that could be interfaced with CoCo. This is a big boy, $1495 list price, but it offers 300 characters a minute and a host of other features. Of course, being a daisy wheel, it prints with letter quality and features interchangable print wheels. Too, because most of its features are in the printer itself, you would only need to use character codes (as offered in a great many CoCo word processors) to access these features. It does require a serial to parallel converter to work with CoCo, though.

IS THIS A "PRINTER" column this month? Maybe so. Because rumor has it that there will soon be a "new" family of printers from Epson America. Aside from Radio Shack, Epson printers seem to be the most popular with CoCo owners—so this might be interesting news for a lot of you. We have not heard much about additional features, but we suspect increased print speed (from the 80 characters per second now available) would be one of them.

READERS SHOULD NOTE that usually we do not mention other products which we have previously reviewed when we give the lowdown on a product. There would be a lot of space problems if we did. The exception to this is usually word processing programs, which usually refer to one another in reviews—primarily because of the large number on the market. An example of our not making reference, however, is last month's takeout on the language *FORTH*, which did not mention *COLOR FORTH* by Armadillo International Software. That program was reviewed in *the Rainbow* several months ago.

WE MADE A couple of mistakes in prices in the December issue and want to set the record straight. It seems some little pieces of paper fell off one of the ads for Color Software Services and messed up the price for their *Flipper* program (really $16.95) and their *Escape* program (really $18.95). The mistake was ours, not theirs.

WITH MORE AND MORE people getting into personal computing, there will be an ever-increasing need for ways to educate them how to use their new machines. One answer would be a school, such as The CompuServe Computer School which has opened in Columbus, Ohio, and will open in Chicago, Dallas and St. Louis shortly.

Schools aside, what's the best piece of advice you can give a new CoCoist? It is to read the manual which comes with his machine. We've seen lots and lots of "first timer" manuals for computers, and there is little doubt that those produced by Tandy are the best! The problem most people have is enthusiasm—they want to rush right to the back of the book (or to *the Rainbow*) and start keying in programs. Not being familiar with syntax, they can make more than the usual number of typing errors. And, when the first *? SN ERROR* shows up, they don't know what to do. A healthy dose of the excellent Tandy manuals (which come with the TDP-100, too) will cure a lot of their problems.

AND NOW THAT it really *is* 1983, we thought you would be interested to know something about our plans for *the Rainbow*. With your support, it will continue to grow and provide you with ever more information and enjoyment for the next 12 months (and the foreseeable future).

We plan more "theme" issues in the coming year, but, frankly, our size means that we will not have to stint on other material as well. While we will have some emphasis on specific themes, there will also be plenty of this and that every month. So, stay tuned.

By the way, some of our "themes" may be a little off the wall, so to speak. What we mean is that we view CoCo as a special computer and to that end we may be a little more free-wheeling with themes than some others. We hope you'll agree that they will be interesting and, in many cases, enjoyable.

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Achieving Motion with *PUT* and *GET*

By Don Inman

***Rainbow* Contributing Editor**

This is the fourth part of a series of articles on the graphic capabilities of Extended Color Basic on the TRS-80 Color Computer. Portions of this article are taken from the book *TRS-80 Color Computer Graphics*, copyrighted by Reston Publishing Company, Inc.

The past two articles have discussed methods of "turning pages" to achieve the effect of movement of figures on the video screen. This time, we'll turn our attention to a different technique. The *PUT* and *GET* statements of Extended Color Basic provide a fast method for moving objects about the video display, provided you observe certain limitations. The major consideration is the size of the objects to be moved. The objects should be kept quite small because of the inherent nature of the actions performed by both *PUT* and *GET*.

THE THREE ACTS OF *PUT* AND *GET*

First, the objects must be drawn. This may be done on the display screen or on a page (or pages) that is not being displayed. We will discuss both methods.

Second, the information used in the drawing is treated as a two-dimensional array by the *GET* statement. The *GET* statement stores this information in an array that has been properly dimensioned.

Third, the *PUT* statement places the information, acquired from the array stored by the *GET* statement, back on the video screen at the specified location.

We'll go into the details of these three acts with a simple example.

ACT 1 - The Drawing

In this example, we'll draw a very simple and very small airplane which will fly across the screen from left to right. We'll represent the ground with some simple line drawings that will not move. When we move the plane, we must provide some method to erase the previous position of our plane. This can be done by choosing appropriate boundaries for the array in which the plane is stored. Since the plane will move from left to right, we'll include a blank area to the left of the plane.

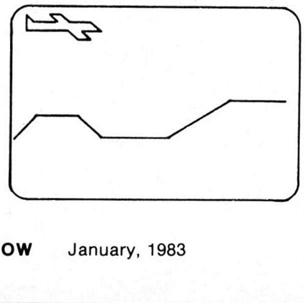
The ground:

```
DRAW "BM1,150;E25R50F10R114E15R40"
```

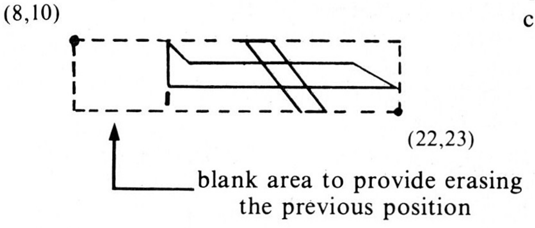
The plane:

```
DRAW "BM12,10;D2R5F1R1H1R4"
DRAW "BM12,10;F1R7"
LINE (20,11) - (22,12), PSET
DRAW "BM16,11;H1R1F1"
```

The screen:



The plane's array: (8,10) - (22,13) ← upper left and lower right coordinates



ACT II - GET

Since the plane was originally drawn in the screen area defined by the coordinates 8,10 and 22,13, the first GET statement must specify this area. Each movement in our demonstration will be four unites to the right (positive X direction). Therefore, each successive GET statement must change by four X units. This can be accomplished neatly in a FOR-NEXT loop.

```
FOR X = 8 TO 22 STEP 4
  GET (X,10)-(X+14,13), A,G
                        ↑ ↑
                        | └get all details of the array
                   we'll assign the variable A
                        to the airplane array
NEXT X
```

ACT III - PUT

In each movement, the plane will be placed four units to the right of the positio used in the GET statement. This can be accomplished in the same FOR-NEXT loop used to GET the plane.

```
FOR X = 8 TO 220 STEP 4
  GET (X,10)-(X+14,13), A,G
  PUT (X+4,10)-(X+18,13), A, PSET
                          ↗   ↑
                         /  PSET # all points in array
                  the same array as in GET
NEXT X
```

PUTTING IT TOGETHER

We now have the basic ingredients to write the program that will fly the plane. However, we are using an array and must dimension the array properly before we can access it. There are two ways to do this:

1) DIM A(14,3) ← use a two-dimensional array

2) DIM A(1) ← use a one-dimensional array

the parameter (1) is derived from:
length times width divided by Z,
where Z = 40 for PMODES 3 and 4
= 80 for PMODES 1 and 2
=160 for PMODE 0
14*3/40 = 1.05 which rounds off to 1

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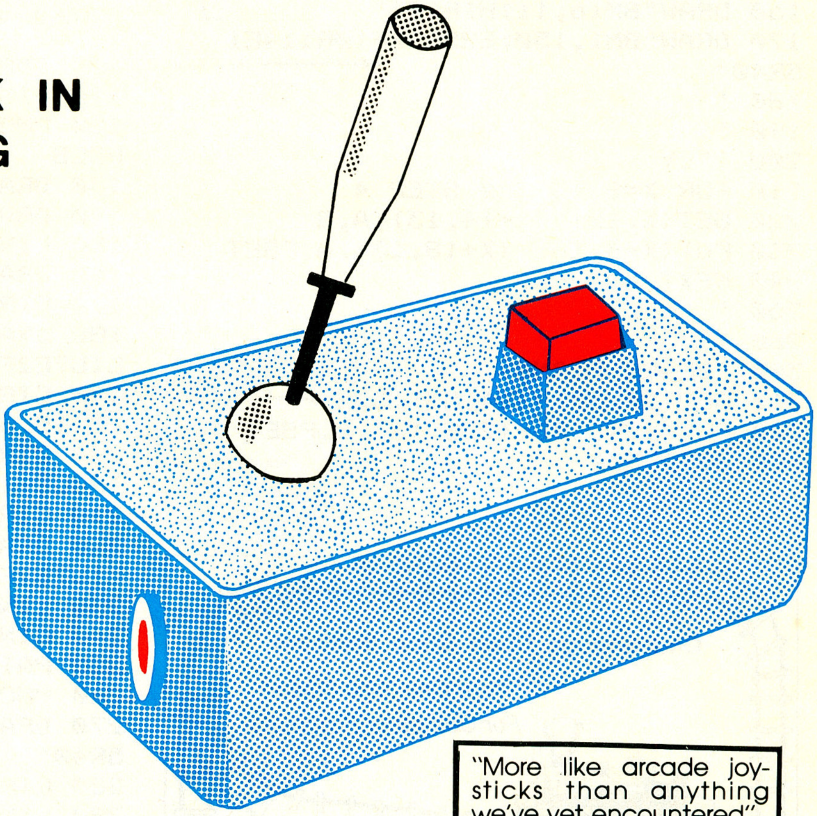

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We will use the second method since it uses less memory. We'll also add a second array (an empty one) to erase the last position of the plane.

FLY BY Program

```
100 'DRAW
110 DIM A(1),B(1)
120 PMODE 4,1: PCLS: SCREEN 1,0  ┐
130 DRAW"BM12,10;D2R5F1R1H1R4"   │
140 DRAW"BM12,10;F1R7"            the plane
150 LINE(20,11)-(22,12),PSET     │
160 DRAW"BM16,11;H1R1F1"         ┘
170 DRAW"BM1,150;E25R50F10R114E1
5R40"                 ◄────the ground
180 '
190 '
200 'FLY
210 FOR X=8 TO 220 STEP 4
220 GET(X,10)-(X+14,13),A,G
230 PUT(X+4,10)-(X+18,13),A,PSET
240 NEXT X
250 '
260 '
300 'BLANK PLANE
310 GET(10,50)-(24,53),B,G ◄────blank array
320 PUT(224,10)-(238,13),B,PSET ◄┐
330 GOTO 330               erases last PUT
```

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STORING ON SEPARATE PAGES

Using PUT and GET directly on the displayed graphics pages works fine when the display is small and simple. If you have numerous figures and/or more complex displays, you can draw your figures on non-displayed pages. You then GET them from the non-displayed pages and PUT them on the displayed pages. We'll add to the FLY BY program to illustrate this second method.

The program will start in a similar way. Midway through the flight, we'll drop a parachutist from the plane. There will be a free-fall period. Then the chute will open, and the chutist will glide to the target area.

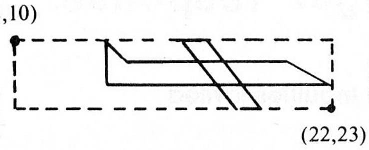
The drawing section of the program becomes:

```
100 'DRAW
110 DIM A(1),B(3),C(4),D(4): CLS
120 PMODE 4,1: PCLS: PMODE 4,5:
PCLS
130 DRAW"BM12,10;D2R5F1R1H1R4"    │
140 DRAW"BM12,10;F1R7"             plane
150 LINE(20,11)-(22,12),PSET      │
160 DRAW"BM16,11;H1R1F1"          ┘
170 CIRCLE(12,23),1               ┐
180 DRAW"BM11,29;L1U4E1F2D7L1NU4  │
L1U7E2F1D4L1"                      chutist
190 CIRCLE(13,46),3,,1,.5,0:CIRC  ┐
LE(15,50),5,,1,.65,.85            │
200 CIRCLE(13,50),5,,1,.65,.85:C  │
IRCLE(11,50),5,,1,.65,.85          chute and
210 CIRCLE(13,56),1                chutist
220 DRAW"BM12,62;L1U4E1F2D7L1NU4  │
L1U7E2F1D4L1"                     │
230 LINE(10,46)-(11,55),PSET      │
240 LINE(16,46)-(15,55),PSET      │
250 PAINT(13,45),1,1              ┘
260 PMODE 4,1
270 DRAW"BM1,150;E25R50F10R114E1  ┐
5R40"                              land and
280 LINE(110,145)-(130,145),PSET   target
290 LINE(119,140)-(119,150),PSET  ┘
300 SCREEN 1,0
310 FOR W=1 TO 500:NEXT W
```

Four arrays are used as shown in Figure 1:

A is the plane as in FLY BY
B is the chutist before the chute opens
C is the chute and chutist after the chute opens
D is the blank array used to erase the chute and the plane at the end of the flight

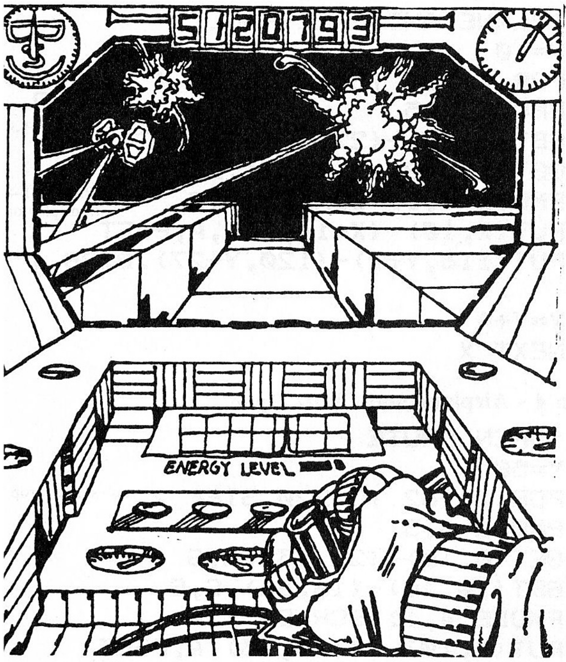
The plane, the chutist, and the chute and chutist together are drawn on pages 5,6,7, and 8. We will GET them from there. The land and the target are drawn on pages 1,2,3, and 4. The screen display (land and target only) are turned on at line 300.



A moves right to left, blank area on the left

NEW ADVANCED
NEW ADVANCED
NEW ADVANCED

STAR*TRENCH



Even if you've tried our short sample version of this game, you will have to own this advanced, highly graphic version of STAR*TRENCH WARFARE. This High-Res Color Game has the most elaborate graphics of any Color Computer Game created to date. We thought it would take 32K to give you the detail of this dazzling simulation, but we've actually crammed it into 16K and added the most remarkable speed and flicker-free animation found in ANY Extended Basic program. (You will not believe this program is really in Basic, plus you can always list our program to learn the programming techniques that make our software stand out from ALL the other basic programs available.)
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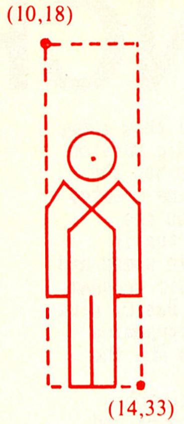
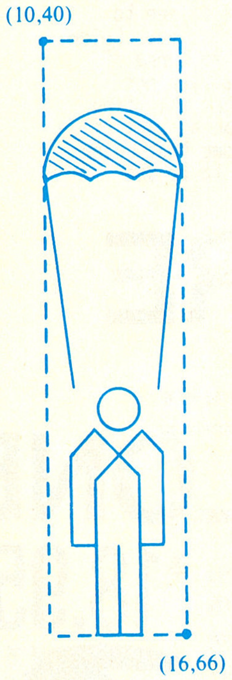


B moves downward, blank area above figure



C moves downward, blank area above figure

Section 2 - Airplane Only

```
400 'AIRPLANE ALONE
410 FOR X=8 TO 100 STEP 4
420 PMODE 4,5                          ┐
430 GET(8,10)-(22,13),A,G              GET from pp.5,6,7,8
                                       ┘
440 PMODE 4,1: SCREEN 1,0              PUT onto pp.1,2,3,4
                                       with display on
450 PUT(X,10)-(X+14,13),A,PSET         ┘
460 NEXT X
```

Section 3 - Airplane and 'chutist

```
500 'PLANE AND FREE-FALL
510 Y=10
520 FOR X=104 TO 160 STEP 4
530 PMODE 4,5                          ┐
540 GET(8,10)-(22,13),A,G              GET from pages 5-8
550 GET(10,18)-(14,33),B,G             ┘
560 PMODE 4,1: SCREEN 1,0              PUT ON PAGES 1-4;
                                       with display on
570 PUT(X,10)-(X+14,13),A,PSET         
580 PUT(116,Y+2)-(120,Y+27),B,PS       ┘
ET
590 Y=Y+4
600 NEXT X
```

Section 4 - Airplane and Chute Open

```
700 'OPEN CHUTE
710 Y=58
720 FOR X=162 TO 220 STEP 2 ← slower drop
730 PMODE 4,5
740 GET(8,10)-(22,13),A,G
750 GET(10,40)-(16,66),C,G
760 PMODE 4,1: SCREEN 1,0
770 PUT(X,10)-(X+14,13),A,PSET
780 PUT(116,Y+2)-(122,Y+28),C,PS
ET
790 Y=Y+2
800 NEXT X
```

Section 5 - End of Flight

```
900 'END
910 GET(10,170)-(22,182),D,G← get blank area
920 PUT(116,120)-(122,132),D,PSE
T                        ←——— PUT over chute
930 PUT(224,10)-(236,13),D,PSET ←┐
                          PUT over plane
940 GOTO 940
```

One last addition is necessary to prepare for the use of all eight pages of graphics memory. Add:

```
90 GOTO 1000
.
.
.
1000 PCLEAR 8: CLEAR 50: GOTO 11
```

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32K ECB

by Dave Hooper

Mathpal is a program designed for children in grades one through five. This program brings color, sound, high resolution graphics, and fun into the art of learning mathematics. The numerals used are bright yellow on a blue background, making the visual appearance of the problem itself much more attractive than the age-old black-on-green style we are used to seeing in this type of program. To break the monotony of this type learning process, there is a reward given for each problem completed successfully. There is also an intermission following the completion of every set of five problems, thus giving the student a short break at specified intervals. This is a program that combines an arcade-style game with a learning experience to produce hours of fun and education for your children.

Key this program into your 80C, then type *CLOAD "MATHPAL"* and hit the *ENTER* key followed by typing *RUN* and *ENTER* once again. Following the introduction you will find a page of instructions explaining the use of the control keys for *Mathpal.* You may use these keys anytime the computer is waiting for an answer to a problem. For example, let's say the screen displays the problem "10 + 4." If you would like to see the answer, just press the letter "A" and the correct answer will be displayed for a short period of time. Then that problem is erased and a new problem appears. NOTE: You will not be credited with a correct answer in this case.

The second option you have at this point is to press the "I" key, which will display the instruction page for a review of the control keys. After you review, press the space bar and you will return to your original problem. Please note that anytime you return to a problem from the instruction page, two zeros appear in the answer block. This brings us to the next option. Pressing the "C" key will clear any unwanted answer you may have in the answer block. So, Press"C" for *clear* and those zeros will go away.

If you should decide that the problems you have selected are too easy, or too difficult, just press the up-arrow key. This will return you to the main menu, where you can reselect a grade level consistent with your ability. Each time you return to the main menu your total score of correct answers is returned to zero, and starts over. Your score will continue to accumulate, however, regardless of how many times you go to the instruction page.

The only remaining option is the "E" key, but first let me explain how to enter your answers. Your answer must be entered from the right to the left, digit by digit. For example, let's assume that your answer is 976. First you would press the numeral "6" and you would see a "6" displayed in the 1's column. Then press the number "7" to see a "7" displayed in the 10's column. Finally you would press the number "9" and watch the "9" be displayed in the 100's column. If you are satisfied with your answer, press the "E" key to enter your answer. You'll know by the sounds and display if your answer is correct or not.

Press the space bar, and progress into the program. Displayed before you now is one of two decisions you must make. The first is your grade level. The three choices determine the degree of difficulty by setting up the top and bottom numbers equal to higher or lower variables. Choice A sets a variable of RND(10) for the top and bottom numbers of all the problems, except for multiplication which is a RND(9) for the top number and one for the bottom. Choice B sets the variables to a RND(50) for the top and bottom numbers and a RND(9) for top and bottom numbers in multiplication. Finally, choice C produces a RND(99) in top and bottom numbers. In mode C, the multiplication numbers are RND(99) for the top and RND(9) for the bottom. In all three grade levels the top number will always be greater than the bottom number in the subtraction mode.

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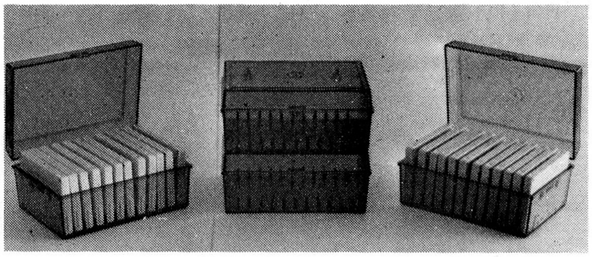

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above. Press *ENTER* once again, and you will be off to a world of education through entertainment.

If you have a 16K machine then you will be interested in the following program changes. You will lose the option of seeing an instruction page, but you can always refer to this issue of the *Rainbow* if you forget. You will also lose the final subroutine which simply commends you on your good work and then asks you if you want to practice any more. So make the following changes and you, too, will be having fun with *Mathpal.*

DEL 1-2
DEL 10-12
DEL 146
DEL 765
DEL 3100-3130

LINE 406 should read: 406 IF TT=15 THEN GOTO 720

LINE 760 should read: 760 SCREEN 1,0:PCLS3: GOTO 300

LINE 665 DELETE THE WORDS: GOSUB 10:

1939 End
12D7 765

```
1 'MATHPAL
2 'COPYRIGHT 1982 BY DAVE HOOPER
9 GOTO500
10 CLS:PRINT@489,"INSTRUCTIONS":
PRINT:GOSUB2600:GOSUB2600:PRINT"
 PRESS 'E' TO ENTER YOUR ANSWER"
:GOSUB2600:PRINT" PRESS 'C' TO C
LEAR YOUR ANSWER":GOSUB2600
11 PRINT" PRESS 'A' TO DISPLAY A
NSWER":GOSUB2600:PRINT" PRESS '^
' TO RETURN TO MENU":GOSUB2600:P
RINT" PRESS 'I' TO RETURN HERE":
PRINT" ENTER ALL ANSWERS FROM RI
GHT":GOSUB2600:PRINT" TO LEFT":P
RINT:GOSUB2600:PRINT:GOSUB2600:P
RINT" PRESS SPACE BAR TO CON
12 IF PEEK(345)=247THENSCREEN1,0
:RETURNELSE12
21 PUT(A,B)-(C,D),J,PSET:RETURN
 22 PUT(A,B)-(C,D),A,PSET:RETURN
 23 PUT(A,B)-(C,D),B,PSET:RETURN
 24 PUT(A,B)-(C,D),C,PSET:RETURN
 25 PUT(A,B)-(C,D),D,PSET:RETURN
 26 PUT(A,B)-(C,D),E,PSET:RETURN
 27 PUT(A,B)-(C,D),F,PSET:RETURN
 28 PUT(A,B)-(C,D),G,PSET:RETURN
 29 PUT(A,B)-(C,D),H,PSET:RETURN
 30 PUT(A,B)-(C,D),I,PSET:RETURN
35 PLAY"V31;T255;L255;O4CDEFGABO
5CDEFGABC"
40 PUT(0,G)-(24,V),M,PSET
45 G=G-40:V=V-40:RETURN
50 PCLS(3):G=172:V=192
55 ZT=INT(TT/10):Z1=TT-ZT*10:ZZ$
="":RESTORE
60 FOR X=1 TO 10
62 READ B$
```

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```
64 IF X=ZT THEN ZZ$=B$+ZZ$
66 IF X=Z1 OR (X=10 AND Z1=0) TH
EN ZZ$=ZZ$+B$
68 NEXT X
69 DRAW"S4;BM104,144"+ZZ$:PAINT(
118,146),2,2
70 IF ZT>0 THEN PAINT(162,146),2
,2
75 DRAW"S4;BM72,12"+SC$+SD$
80 FORH=18TO225STEP16
85 PUT(H-14,80)-(H+30,96),L,PSET
:FORX=1TO100:NEXT:PLAY"V31;L255;
T255;O1D"
100 PSET(H-12,96,2)
105 NEXTH
110 A$="V31;T30;O4CL2DEL1CP1CL2D
EL1CP1L2CDECDECDEL1CP2"
115 B$="V31;T30;O4FL2GAL1FP1FL2G
AL1FP1L2FGAFGAFGAL1FP2"
120 PLAYA$+B$:PLAYA$
125 C$="V31;T255;L255;O1CDEFGABO
2CDEFGABO3CDEFGABO4CDEFGABO5CDEF
GAB"
130 PLAYC$+C$:PLAYC$
135 RETURN
137 ON KK GOSUB 21,22,23,24,25,2
6,27,28,29,30:RETURN
140 T=0:X=0:Y=0:W=0
143 IF PEEK(341)=247THENPCLS(3):
GOTO718
145 Q$=INKEY$:IF Q$=""THEN143
146 IFPEEK(339)=253THENGOSUB10
147 IF PEEK(341)=247THENPCLS(3):
GOTO718
150 IFQ$="E"THENMS=W+(X*10)+(Y*1
00):RETURN
155 IFQ$="C"THENT=3:GOTO175
157 IFQ$="A"THENGOTO3000
160 IF T=0 THEN W=VAL(Q$):A=134:
B=140:C=162:D=176:IF W=>0 THEN K
K=W+1:GOSUB137
165 IF T=1 THEN X=VAL(Q$):A=90:C
=118:IF X=>0 THEN KK=X+1:GOSUB 1
37
170 IF T=2 THEN Y=VAL(Q$):A=46:C
=74:IF Y=>0 THEN KK=Y+1:GOSUB 13
7
175 IF T=3 THEN LINE(46,140)-(16
2,176),PRESET,BF:W=0:X=0:Y=0:T=0
:GOTO145
180 T=T+1:GOTO145
200 FORT=1TO7
205 PLAY"V31;T255;L255;O1CEGBGEC
EGBGEC"
210 NEXT
215 LINE(46,140)-(162,176),PRESE
T,BF:RETURN
300 TN=RND(TI):BN=RND(BI)
302 IFM=2ANDCH$="A"THENTN=RND(9)
:BN=1ELSEIFM=2ANDCH$="B"THENTN=R
ND(9):BN=RND(9)ELSEIFM=2ANDCH$="
```

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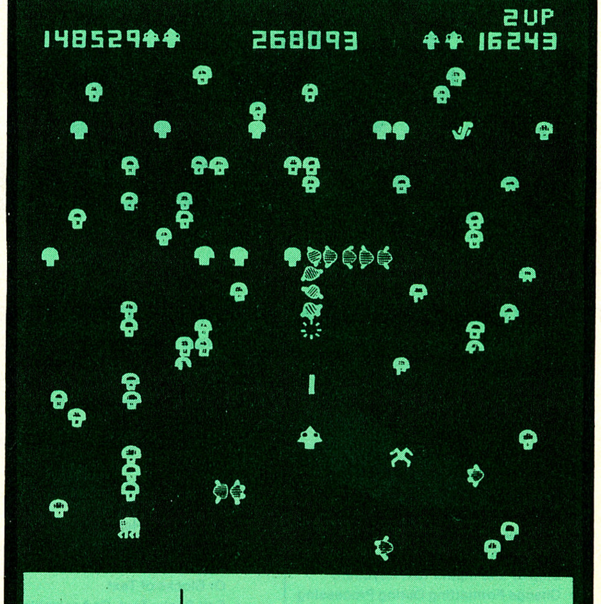

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```
C"THENTN=RND(99):BN=RND(9)
305 IF M=1 AND TN<BN THEN 300
306 IF M=2 AND TN<BN THEN 300
307 IF M=0 THEN S=TN+BN
308 IF M=1 THEN S=TN-BN
310 IF M=2 THEN S=TN*BN
315 E=INT(TN/10):F=INT(BN/10)
320 IF E>0 THEN H=(TN-E*10)ELSEH
=-1
325 IF F>0 THEN I=(BN-F*10)ELSEI
=-1
330 IF E<1 THEN A=134:B=28:C=162
:D=64:KK=TN+1:GOSUB 137
335 IF E>0 THENA=90:B=28:C=118:D
=64:KK=E+1:GOSUB 137
340 IF E>0 THEN A=134:C=162
345 IF H=>0 THEN KK=H+1:GOSUB 13
7
350 IF F<1 THEN A=134:B=80:C=162
:D=116:KK=BN+1:GOSUB 137
355 IF F>0 THEN A=90:B=80:C=118:
D=116:KK=F+1:GOSUB 137
360 IF F>0 THENA=134:C=162
365 IF I=>0 THEN KK=I+1:GOSUB 13
7
370 DRAW"S4;BM46,123R116D1L116D1
R116"
375 IF M=0 THENDRAW"S8;BM64,104"
+P$
377 IF M=1 THEN DRAW"S8;BM64,104
"+M$
378 IF M=2 THEN DRAW"S8;BM64,104
"+MM$
380 GOSUB140
385 IF MS><S THEN GOSUB 200:GOTO
380
390 IF MS=S THEN TT=TT+1:P=P+1:G
OSUB35:LINE(46,28)-(164,180),PRE
SET,BF
395 FOR LL=5 TO 75STEP5
400 IF TT=LL THEN GOSUB 50:GOTO4
06
404 NEXTLL
405 GOTO300
406 IF TT=15 OR TT=30 OR TT=45 O
R TT=60 OR TT=75 THEN3100
407 IFPG$<>"AL"THEN:PCLS(3):P=0:
GOTO300
410 IF M=0 THEN M=1:PCLS(3):P=0:
GOTO300
412 IF M=1 THEN M=2:PCLS(3):P=0:
GOTO300
413 IF M=2 THEN M=0:PCLS(3):P=0:
GOTO300
415 GOTO300
500 PCLEAR4:PMODE3,1:PCLS(3):CLE
AR300:DIMA(27),B(27),C(27),D(27)
,E(27),F(27),G(27),H(27),I(27),J
(27),L(20),M(14)
505 COLOR2,3
515 DRAW"S4;C2;BM40,60BD8D3R1E1R
3F4R9E4R3F2R1U5L3D1L11H1U3E1R6H3
L13G2D5G1L1BD5BR2E1R1F1D1G1L1H1U
1BR20E1R1F1D1G1L1H1U1"
520 PAINT(48,64),2,2:GET(24,60)-
(68,76),L,G
525 LINE(76,108)-(74,114),PSET:L
INE-(66,114),PSET:LINE-(72,119),
PSET:LINE-(70,126),PSET:LINE-(76
,121),PSET:LINE-(82,126),PSET:LI
NE-(80,119),PSET:LINE-(86,114),P
SET:LINE-(78,114),PSET:LINE-(76,
108),PSET:PAINT(76,118),2,2
530 GET(64,108)-(88,128),M,G
535 PCLS(3):GOSUB1015:SCREEN1,0
635 A=18:B=6:N=1
640 FORX=1TO20
643 IF X>10 THEN C=A+28:D=B+36:K
K=N:GOSUB137:GOSUB2600:GOTO655
644 READ B$
645 DRAW"S4;BM"+STR$(A)+","+STR$
(B)+B$
650 PAINT(A+14,B+2),2,2:GOSUB260
0
653 ON N GOSUB 670,675,680,685,6
90,695,700,705,710,715
655 N=N+1:IF N>10 THEN N=1
660 A=A+44:IF A=238 THEN A=18:B=
B+42
665 NEXTX:FORX=1TO10:SCREEN1,0:G
OSUB2600:FORY=1TO50:NEXTY:SCREEN
```

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```
1,1:GOSUB2600:FORY=1TO50:NEXTY:N
EXTX:SCREEN1,0:PCLS3:GOSUB10:GOT
O720670 GET(18,6)-(46,42),A,G:RE
TURN
675 GET(62,6)-(90,42),B,G:RETURN
680 GET(106,6)-(134,42),C,G:RETU
RN
685 GET(150,6)-(178,42),D,G:RETU
RN
690 GET(194,6)-(222,42),E,G:RETU
RN
695 GET(18,48)-(46,84),F,G:RETUR
N
700 GET(62,48)-(90,84),G,G:RETUR
N
705 GET(106,48)-(134,84),H,G:RET
URN
710 GET(150,48)-(178,84),I,G:RET
URN
715 GET(194,48)-(222,84),J,G:RET
URN
718 TT=0
720 CLS:PRINT@487,"WHAT GRADE LE
VEL?":GOSUB2600:PRINT:PRINT"
  a. GRADE  1 THRU 2":GOSUB2600
:PRINT:PRINT"          b. GRADE  2
THRU 3":GOSUB2600:PRINT:PRINT"
     c. GRADE  3 THRU 5":GOSUB26
00:FORD=1TO4:PRINT:GOSUB2600:NEX
T
725 INPUT"           ENTER CHOICE N
OW";CH$:IFCH$=""THEN725
735 IFCH$="A"THENTI=10:BI=10ELSE
IFCH$="B"THENTI=50:BI=50ELSEIFCH
$="C"THENTI=99:BI=99ELSEGOTO720
740 CLS:PRINT@483,"DO YOU WISH T
O PRACTICE:":GOSUB2600:PRINT:PRI
NT"      a. ADDITION":GOSUB2600
:PRINT:PRINT"         b. SUBTRACTI
ON":GOSUB2600:PRINT:PRINT"
 c. MULTIPLICATION":GOSUB2600:PR
INT:PRINT"        d. ALL THE ABOV
E"
743 FORD=1TO3:PRINT:GOSUB2600:NE
XT:G=172:V=192
745 INPUT"          CHOOSE ONE NOW
";SL$:IFSL$=""THEN745
755 IFSL$="A"THENM=0:PG$=""ELSEI
FSL$="B"THENM=1:PG$="":ELSEIFSL$
="C"THENM=2:PG$="":ELSEIFSL$="D"
THENM=0:PG$="AL"ELSEGOTO740
760 IFNA$=""THENCLS:PRINT@483,"W
HAT IS YOUR FIRST NAME?":FORLC=1
TO8:GOSUB2600:PRINT:NEXT:INPUT"
     ";NA$:IFNA$=""THEN760
765 SCREEN1,0:GOTO300
1000 DATA "BR12NR4G4D4R4D24L12D4
R28U4L12U32BR28","BR4NR20G4D4R4E
4R12F4D4G4L16G4D12F4R24U4L20H4U4
E4R16E4U12H4BR20","BR4NR20G4D4R4
E4R12F4D4G4L12D4R12F4D4G4L12H4L4
D4F4R20E4U28H4BR20"
```

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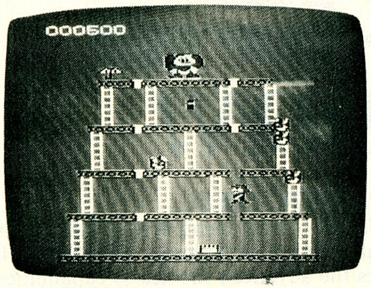

32K

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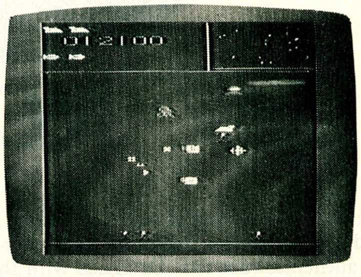
16K



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```
1005 DATA "BR12NR8G12D8R16D16R4U
16R8U4L8U16BG4L2G10D2R12U12BU4BR
28","NR28D16R20F4D8G4L20D4R24E4U
16H4L20U8R24U4BR16","BR4NR20G4D2
8F4R20E4U12H4L16G4BD5D3F4R12E4U3
H4L12G4BU5U12E4R12F4R4U4H4BR20"
1010 DATA "NR28D4R24D32R4U36BR16
","BR4NR20G4D8F4D4G4D8F4R20E4U8H
4U4E4U8H4BD8H4L12G4D3F4NR12BD6NR
12G4D3F4R12E4U3H4BU6E4U3BU8BR20"
,"BR4NR20G4D8F4R20D20R4U32H4BD7D
2G4L12H4U2E4R12F4BU7BR20"
1015 DATA "BR4NR20G4D28F4R20E4U2
8H4BG4L12G4D20F4R12E4U20H4BR24BU
4":P$="NU4NL4ND4R4":M$="NL4R4":S
C$="D8R16D8NL16BU16NL16BR8NR16D1
6R16BU16BR8NR16D16R16U16BR8"
1020 SD$="NR16D8ND8R8NF8R8U8BR8N
R16D8NR8D8R16":MM$="NE4NF4NG4H4"
1025 RETURN
2500 FORX=1TO1000:NEXT
2505 GOSUB2600
2510 PCLS(3):RETURN
2600 PLAY"V31;T255;L255;O3BF":RE
TURN
3000 A=0:B=0:C=0:D=0:LL=0:J=INT(
S/100):K=(S-J*100)
3005 L=INT(K/10)
3010 IF L>0 THEN LL=(K-L*10)
3015 IF S<10 THEN A=134:B=140:C=
162:D=176: KK=S+1:GOSUB 137:GOTO
3030
3020 IF S>9 AND S<100 THEN A=90:
B=140:C=118:D=176:KK=L+1:GOSUB 1
37:A=134:C=162:KK=LL+1:GOSUB 137
:GOTO3030
3025 IF S>99 THEN A=46:B=140:C=7
4:D=176:KK=J+1:GOSUB137:A=90:C=1
18:KK=L+1:GOSUB137:A=134:C=162:K
K=LL+1:GOSUB137:GOTO3030
3030 FORT=1TO1500:NEXT:LINE(46,2
8)-(164,180),PRESET,BF:GOTO300
3100 CLS:PRINT@484,NA$",":FORLC=
1TO12:GOSUB2600:PRINT:NEXT:PRINT
@129,"IT SURE IS GREAT TO SEE YO
U":PRINT@161,"ARE WORKING ON:"
3105 IFSL$="A"THENPRINT@264,"ADD
ITION"ELSEIFSL$="B"THENPRINT@264
,"SUBTRACTION"ELSEIFSL$="C"THENP
RINT@264,"MULTIPLICATION"ELSEIFS
L$="D"THENPRINT@264,"ALL YOUR MA
TH"
3110 FORSR=1TO3:GOSUB2500:NEXTSR
:FORLC=1TO15:GOSUB2600:PRINT:NEX
T
3115 PRINT@482,"WOULD YOU LIKE M
ORE PRACTICE?":GOSUB2600:PRINT:P
RINT"         SELECT (Y/N)":FOR
LC=1TO4:GOSUB2600:PRINT:NEXT
3120 QE$=INKEY$:IFQE$=""THEN3120
3125 IFQE$="Y"THEN720
3130 END
```

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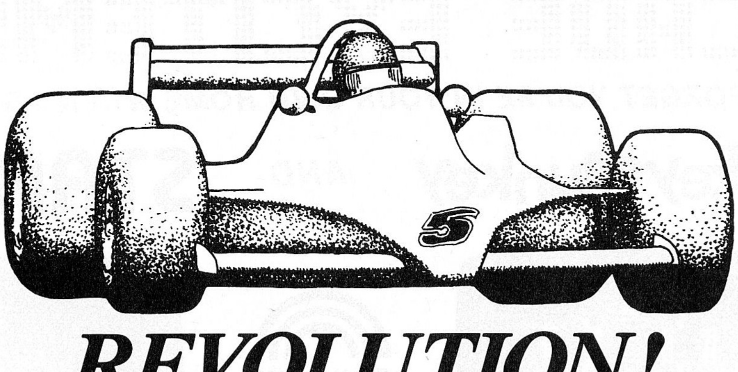

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Speed Up Basic With ML Injections

By Charles J. Roslund
***Rainbow* Contributing Editor**

(Mr. Roslund is the author of ***War Kings*** *and many machine language utilities for the 80C.)*

One very good use of machine language programming is the incorporation of machine language subroutines in a Basic program to gain speed, or to perform a function that Basic is not capable of. Once the machine language program is written, you must incorporate it into the Basic program. There are three methods for accomplishing this.

The first, and most straight-forward method, is to *READ* the object (machine language) code from *DATA* statements, one byte at a time, and *POKE* it into memory as it is read. An example of this method is:

```
10 CLEAR 200,15000:' reserve high memory
20 FOR I=15000 TO 15005: READ A
30 POKE I,A: NEXT I
40 EXEC 15000:' sample call of routine
50 DATA 134,1,183,5,16,57
```

This program will put a machine language program in memory and execute it (in line 40). This sample machine language program is only six bytes long and all it does is put a reverse video "A" near the middle of the screen. The SOURCE code for this short machine language program looks like:

```
8601 LDA #1
B70510 STA $0510
39 RTS
```

The main disadvantage to this method of incorporating machine language subroutines into Basic programs is the tremendous waste of memory. For each byte of object code we needed to get into memory, there are several bytes in the basic *DATA* statement plus the memory used by the *FOR/NEXT* loop, the *READ* statement, and the *POKE* statement. Also two variables (I and A) were defined, and these each consume seven bytes of memory. If you have lots of free memory and can afford this waste, this method is perfectly adequate. In many cases, however, you do not want to waste memory, and a more memory-efficient method of getting the object code into memory is needed.

The second method, which is much more memory efficient (but has a few drawbacks) involves embedding the object code into a Basic program line. This is typically accomplished by creating a Basic program line that looks like this:

```
10 ML=PEEK(47)*256+PEEK(48)+31:REM
*****************
```

Locations 47 and 48 contain the address of the beginning of the line the Basic interpreter is currently running. In this example, they point to the beginning of line 10 at the time the PEEK's are done, and ML is assigned this value + 31. By adding 31 to this beginning-of-line pointer we have ML pointing to the first "*" in the REM at the end of the line. It is important to enter this line exactly as it appears, or the number 31 will have to be re-calculated. The next step is to locate these *'s in memory and move your machine language program into the area where the *'s are located. This can be accomplished as follows:

1. Load a monitor such as MINI-MON (see October *Rainbow*).
2. Display the memory locations $0019,$001A. These two bytes form an address that points to the beginning of the Basic program area in memory. (MINI-MON command D 0019)
3. Start displaying memory from the beginning of the Basic program area, looking for a series of *'s. The asci value of "*" is $2A. Note the address of the beginning of the series of *'s.
4. Put you machine language program into memory, starting at the address of the first "*." You could enter the object code, one byte at a time, using the monitor. The MINI-MON command would be S (address of first "*"). If you have a tape or disk copy of the machine language program, you can load it into unusued memory and use the Block Move function of the monitor to copy the object code into this area (MINI-MON command M).
5. Exit the monitor and you have embedded machine language in a Basic program.

If the first byte of the machine language program is also the *EXECute* address, you may call this machine language program by *EXEC ML.* You may also define a user function : *DEF USR0*=ML. The six-byte program in the first example may be embedded for a trial of this method. Note that you need to enter at least as many *'s in the REM as you have bytes of code to embed. This is one drawback of this method, since Basic program lines cannot be longer than 247 characters. This means you cannot easily embed a machine language program of more than about 220 bytes in length. Another restriction of this method is that the program you embed cannot contain any "0" byte values. This restriction stems from the fact that the basic interpreter recognizes a zero byte as an end of line marker during one of the routines called when a Basic program is loaded from tape or disk.

After embedding a machine language program with this method, the listing will look very strange because of the Basic interpreter untokenizing byte values in the REM statement when it lists to the screen. One further restriction is that you must never *EDIT* the line with the embedded code, or you will destroy the code. This is due to the Basic interpreter untokenizing the line when listing it, but not re-tokenizing past the *REM* statement after *EDITing*.

The third method I will describe has none of the drawbacks of the previously described methods, and I feel it is the best technique for embedding machine language in Basic programs. I will describe this technique in greater detail than the first two methods discussed for this reason.

The use of this method requires an understanding of a few pointers Basic uses in low memory, specifically:

$0019 & $001A - Beginning of Basic program pointer
$001B & $001C - End of Basic program/Beginning of variable storage area pointer

The memory between these two pointers is reserved by the Basic interpreter for Basic program storage. Also, when you *CSAVE*, or save to cassette or disk, these pointers define the memory area that is written to tape or disk. The idea behind this method is quite simple once you know how these pointers function. All we need to do is change the pointer at $001B, $001C to make room for the machine language program to be embedded right in the Basic program storage area. For example, if we had a six-byte-long machine language program to embed, we add six to this pointer. Then put the object code to be embedded into this area that has been opened up. Your Basic program can find the beginning of your machine language program by counting back from the modified end of program pointer ($001B, $001C) . For this six-byte example you would insert the Basic line:

```
10 ML=PEEK(&H1B) *256+PEEK(&HIC)-9
```

The value of ML will be the address of the beginning of the

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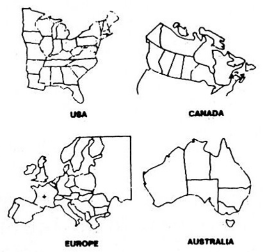

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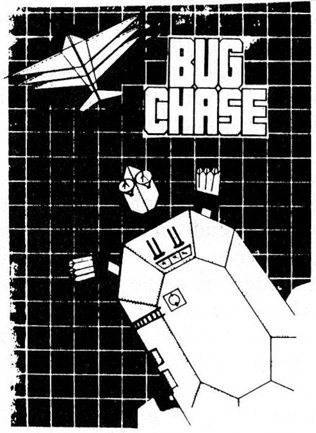

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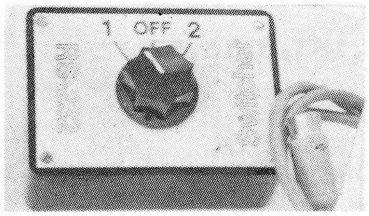

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embedded machine language program. You may call this program, as in the second method described, by *EXEC ML* or *DEF USR0=ML.*

As I earlier stated, this method of embedding carries no restrictions on program length or non-zero byte values. Since the object code is not in a Basic program line, it can be as long as desired. The use of zero byte values is allowed because the routine mentioned in method two, that is called when a Basic program is loaded from tape or disk, stops as the true end of the Basic program, as it finds three consecutive zero's there. It does not even look at your embedded machine language. Another nice feature of this method is that the embedded object code is invisible on program listings. The listings stop at the three zero's defining the true end of the Basic program.

Following, is a step by step procedure for embedding machine language with this method. I will embed the six-byte program earlier mentioned as an example.

STEP 1—Load the Basic Program you wish to embed a machine language program into. My example will be the two line program:

10 ML=PEEK(&H1B)*256+PEEK(&HIC)-9

20 EXEC ML: REM sample call of machine language program

STEP 2—Load a monitor (such as MINI-MON, see October *Rainbow* to make the rest of the job much easier. Note: Be sure to load the monitor into a memory area that will not overwrite your Basic program. High memory (Reserved with a *CLEAR* statement is a safe spot. If you use MINI-MON, enter these commands:

CLEAR 200,&H3D00 (ENTER)
CLOADM"MINIMON",&H2D00 (ENTER)
EXEC (ENTER)

STEP 3—Using the monitor, examine and record memory locations $001B and $001C. The original contents of locations $001B, $001C will be referred to as "original address." Treating these two locations as an address, add the length of your object code +3 to them. I'll explain these three extra bytes later. (Remember this is a 16-bit hexadecimal number.) The result of this calculation will be referred to as "new-address." If you're not sure about your hexadecimal math you may do the following:

Record the values of locations $001B, $001C. The MINI-MON command is *D 001B (ENTER).* This value should be a four-digit hexadecimal number (262B was the number on my disk Basic computer).

Exit the monitor, MINI-MON command *G.*

In Extended Basic, *ENTER* the command *?HEX$(&H262B+6+3) (ENTER).* These sample numbers would yield the result 2634. 262B should be replaced by the "original address" obtained in the previous step. Six is the length of our sample program. The number returned will be referred to as "new address."

Enter the monitor again. If using MINI-MON, just *EXEC (ENTER)*

STEP 4—Store the "new-address" in location $001B, $001C. MINI-MON command is:

S 001B (ENTER)
26 (ENTER) high byte for my example
34 (ENTER) low byte for my sample numbers
/ (ENTER)

STEP 5—Exit the Monitor and enter the basic command *CLEAR (ENTER).* This is required to move some other Basic pointers that point to array variable storage and start of free memory. When the *CLEAR* statement is executed, the Basic interpreter looks at the contents of $001B, $001C and modifies these other pointers relative to this one.

STEP 6—Enter the monitor again (*EXEC (ENTER*) and now we can install our object code beginning at "original address." If using MINI-MON, *ENTER* the following:

S 262B (ENTER) (original address) for my sample numbers

86 (ENTER)
01 (ENTER)
B7 (ENTER)
05 (ENTER)
10 (ENTER)
39 (ENTER)
00 (ENTER)
00 (ENTER)
00 (ENTER)
/ (ENTER)

At the end of the object code, you must put three zero-byte values in memory as shown above. This is required because the Basic interpreter wants to see three zero's in memory immediately preceding the address $001B, $001C points to.

STEP 7—That completes the embedding operation. You may now exit the monitor and save a copy of your program on tape or disk. You could also try running it, if you're brave. Before running the program for the first time, it's usually a good idea to add one more Basic line, temporarily:

15 ?HEX$(ML),HEX$(PEEK(ML)):STOP

This will display the address you are about to execute, followed by its contents. If the content is not the first byte of your machine language program, (in this example $86) you made a mistake somewhere. In that case you may want to examine memory near the address "ML" and see if you can find where your machine language program does start. If all checks out okay, you may delete this temporary line and run the program.

You may *EDIT* any lines of the Basic program, or add new lines with no adverse effects when using this method for embedding machine language. One important note on writing machine language programs that will be embedded is that you must write position independent code. This is an obvious requirement since the object code is being located at the end of your Basic program, and this location will change if you edit your Basic program. If you are embedding a large machine language program, rather than entering it by hand as I did in this example, you could do the following: *LOADM* the machine language program into a reserved memory area, and, using a block memory move command from a monitor (such as *MINI-MON*), move the object code into your basic program.

```
CHARLIE METHOD1

10 CLEAR 200,15000
20 FOR I=15000 TO 15005: READ A
30 POKE I,A: NEXT I
40 EXEC 15000
50 DATA 134,1,183,5,16,57
```

```
CHARLIE METHOD 2

10 ML=PEEK(47)*256+PEEK(48)+31:R
EM DATATRON9**
20 EXEC ML
```

```
CHARLIE METHOD 3

10 ML=PEEK(&H1B)*256+PEEK(&H1C)-
9
20 EXEC ML
```

Software Review...

UP-1 Works (If You Know How)

The *UP-1* is a Color Basic program designed to allow purposeful peeks and pokes into memory. Data or machine language instructions can be manipulated in memory and stored or retrieved from cassette. The program is also touted as a mini word processor and as a potential editor for Basic programs. The software consists of nine subprograms selected from a main menu.

Unfortunately, it required considerable effort and repeat readings of the supplied documentation to understand the purpose of this software. The documentation is not easily understandable. Several fairly knowledgeable computerists I know were unable to fathom the function of *UP-1*.

It was finally determined what *UP-1* is all about. Part of the problem is that the author makes reference to data contained in various memory locations which are different for 4K, 16K and disk-based machines. After deciding that this program was written for a 4K machine, the pieces fell into place. The author mentions correcting bugs in a Basic program by scanning memory with *UP-1* and then *POKEing* a corrected byte here and there until the program functions. At first, I thought why bother with that? Just use Basic's *EDIT* command to do the job. That's when I realized the author must be using a 4K machine, no *EDIT* function.

In summary, I must admit that *UP-1* does what it says it does, although I found it extremely clumsy to use. I personally feel there are better ways of doing word processing, and better ways of doing memory *PEEKs* and *POKEs*.

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Laurence Preble

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Game...

Running From Orcs Can Be "Hobbit-Forming"

16K

By David Sweet

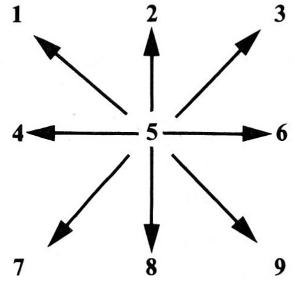
If you were a Hobbit, wandering through the woods on an important Hobbit errand, and suddenly found yourself surrounded by (shudder) dreaded orcs, what in middle-earth would you do?

Since you have in your possession the magical CoCo (a gift from Gandolf, perhaps?) you need only to strike the "N" key to be whisked to safety—at least for the moment. But you need to be careful, for stroking the "N-Amulet" only works once!

The object of this engaging game is for the "Hobbit" (the player) to escape from the orcs, which resemble a popular arcade-game character.

After typing *RUN* the player will be asked how many orcs he thinks he can escape from. Pick five this time and hit *ENTER*. The screen will then be cleared and five orcs, quite a few trees, and a pair of flashing eyes (that's the Hobbit) will appear. If you are in a bad position (surrounded by four orcs, or cornered) you may hit "N" and receive a new screen. As we said, you may only do this once, and after you have moved you cannot use this option at all. To eliminate the orcs, you must guide them into the trees. Orcs are not very intelligent!

Movement is like this:



For example: typing a "2" will move you one position up and a "9" will move you one position right and one down.

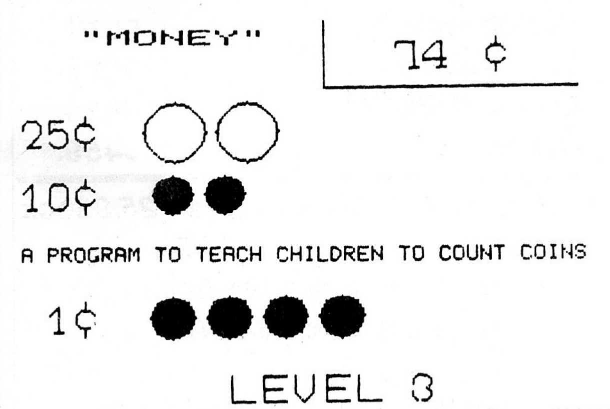
A "5" cannot be typed twice in a row. Once you move by typing the appropriate number, the orcs will begin moving. This will continue until all the orcs are eliminated or you are caught!

The game includes a three-round scoring system which is self-explanatory.

The listing:

0E17 End

```
10 PCLEAR 4
20 GOSUB 1020
30 'NEW GAME
40 NR=0:TS=0
50 PLAY "T3O2L24GP24O3CP24EP24L1
2GP12L24EP24L3G"
60 'NEW SCREEN
70 CLS
80 INPUT "HOW MANY ORCS(5,25) ";
NO
90 IF NO<5 OR NO>25 THEN 80
100 CLS
110 PMODE 1,3
120 SCREEN 1,0
130 NT=0
140 FOR I=1 TO 14:FOR J=1 TO 10
150 BD(I,J)=0
160 NEXT J,I
170 X=RND(14):Y=RND(10):BD(X,Y)=
1
180 FOR I=1 TO NO
190 BX(I)=RND(14):BY(I)=RND(10)
200 IF BD(BX(I),BY(I))<>0 THEN 1
90
```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```
210 BD(BX(I),BY(I))=3
220 NEXT I
230 FOR I=1 TO 33
240 TX=RND(14):TY=RND(10)
250 IF BD(TX,TY)<>0 THEN 240
260 BD(TX,TY)=2
270 NEXT I
280 'SCREEN
290 P=0
300 PMODE 1,1
305 IF CL=0 THEN CL=1 ELSE CL=0
310 SCREEN 1,CL
320 PCLS 3
330 FOR TX=0 TO 15
340 FOR TY=0 TO 11
350 ON BD(TX,TY)+1 GOTO 380,380,
360,370
360 PUT(TX*16,TY*16)-(TX*16+10,T
Y*16+10),TR:GO TO 380
370 PUT(TX*16,TY*16)-(TX*16+10,T
Y*16+10),MN
380 NEXT TY,TX
390 PUT(X*16,Y*16)-(X*16+10,Y*16
+10),HB
400 FOR I=1 TO 250:A$=INKEY$:IF
A$<>"" THEN 430:ELSE NEXTI
410 PUT(X*16,Y*16)-(X*16+10,Y*16
+10),HB,NOT
420 GOTO390
430 IF A$<>"N" THEN 450
440 IF NT=0 THEN NT=1:FOR P=1 TO
 211 STEP 15:SOUND P,1:NEXT P:PM
ODE 1,3:SCREEN 1,1:GO TO 140
450 J=VAL(A$)
460 IF J<1 OR J>9 OR (J=5 AND P=
5) THEN SOUND 100,1:GOTO390
470 P=J
480 PUT(X*16,Y*16)-(X*16+10,Y*16
+10),BL
490 BD(X,Y)=0
500 ON J GO TO 510,520,510,540,5
70,540,550,560,550
510 X=X+J-2
520 Y=Y-1
530 GO TO 570
540 X=X+J-5:GO TO 570
550 X=X+J-8
560 Y=Y+1
570 NT=NT+1:ON BD(X,Y)+1 GOTO 58
0,580,860,870
580 BD(X,Y)=1:PUT(X*16,Y*16)-(X*
16+10,Y*16+10),HB
590 'THEIR TURN
600 J=0
610 FOR I=1 TO NO
620 IF BX(I)=0 THEN 830
630 BD(BX(I),BY(I))=0
640 XT=BX(I)*16:YT=BY(I)*16
650 PUT(XT,YT)-(XT+10,YT+10),BL
660 IF BX(I)>X THEN BX(I)=BX(I)-
1
670 IF BY(I)>Y THEN BY(I)=BY(I)-
1
680 IF BX(I)<X THEN BX(I)=BX(I)+
1
690 IF BY(I)<Y THEN BY(I)=BY(I)+
1
700 XT=BD(BX(I),BY(I))+1
710 ON XT GOTO 810,720,820,820
720 FOR P=1 TO 3
730 SCREEN 1,0
740 FOR XT=1TO150:NEXT XT
750 SCREEN 1,1
760 FOR XT=1 TO 150:NEXT XT
770 NEXT P
780 PLAY T$
790 PRINT "GUESS WHAT IS FOR DIN
NER":PRINT "TONIGHT?"
800 GO TO 880
810 BD(BX(I),BY(I))=3:J=1:PUT(BX
(I)*16,BY(I)*16)-(BX(I)*16+10,BY
(I)*16+10),MN:GO TO 830
820 BX(I)=0
830 NEXT I
840 IF J=1 THEN 390
850 PLAY W$:PRINT "YOU LUCKY HOB
BIT!":PRINT "YOU HAVE CLEARED TH
E FOREST OF  ORCS!":GO TO 880
860 PLAY T$:CLS:PRINT"SILLY HOBB
IT YOU RAN INTO A     TREE!":GO
TO 880
870 PLAY T$:CLS:PRINT"YOU RAN SM
```

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```
ACK DAB INTO AN ORC!"
880 PRINT:PRINT"SCORE FOR THE RO
UND:"
890 NJ=0:FOR I=1 TO NO:IF BX(I)<
>0 THEN NJ=NJ+1
900 NEXT I
910 PRINT:PRINT USING F$;NO-NJ;:
PRINT " # OF ORCS KILLED"
920 IF NJ=0 THEN PRINT " 10 PTS
FOR CLEARING THE FOREST":RS=10:E
LSE RS=-5:PRINT " -5 FOR GETTING
 EATEN"
930 PRINT "---"
940 RS=RS+NO-NJ:PRINT USING F$;R
S;:PRINT " TOTAL FOR ROUND";NR+1
950 TS=TS+RS
960 NR=NR+1:IF NR=3 THEN 990:ELS
E PRINT "YOUR SCORE SO FAR IS ";
TS;"."
970 PRINT"HIT ANY KEY TO CONTINU
E.";
980 A$=INKEY$:IF A$<>"" THEN 70
ELSE 980
990 PRINT "YOUR FINAL SCORE IS "
;TS;"."
1000 PRINT:PRINT "HIT ANY KEY TO
 PLAY AGAIN.";
1010 A$=INKEY$:IF A$<>"" THEN 40
 ELSE 1010
1020 F$="###"
```

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```
1030 W$="T2O3L16CP16O2L32GP32GP3
2L8AGP8L16BP16O3C"
1040 T$="T5L4FFL8FL4FG+L8GL4GL8F
L4FL8EL2F"
1050 XT=RND(TIMER)
1060 DIM MN(9,9),TR(9,9),HB(9,9)
,BL(9,9),BD(15,11),BX(25),BY(25)
1070 PMODE 1,1
1080 PCLS 3
1090 SCREEN 0,1
1100 COLOR 1,3
1110 LINE (4,0)-(6,0),PSET
1120 LINE (2,3)-(8,3),PSET
1130 LINE (2,5)-(8,5),PSET
1140 LINE(2,7)-(8,7),PSET
1150 LINE(0,9)-(10,9),PSET
1160 PSET(4,5,4)
1170 PSET(9,5,4)
1180 PSET(7,7,4)
1190 GET(0,0)-(10,10),MN
1200 PCLS 3
1210 COLOR 6,3
1220 LINE(4,0)-(6,0),PSET
1230 LINE(2,2)-(8,2),PSET
1240 LINE(2,4)-(8,4),PSET
1250 LINE(2,6)-(8,6),PSET
1260 FOR Y=8 TO 10 STEP 2
1270 FOR X=4 TO 6
1280 PSET(X,Y,4)
1290 NEXT X,Y
1300 GET(0,0)-(10,10),TR
1310 PCLS 3
1320 GET(0,0)-(10,10),BL
1330 PSET (4,4,4):PSET(8,4,4)
1340 GET(0,0)-(10,10),HB
1350 FOR I=0 TO 15:BD(I,0)=2:BD(
I,11)=2:NEXTI
1360 FOR I=1 TO 10:BD(0,I)=2:BD(
15,I)=2:NEXTI
1370 PMODE 1,3
1380 PCLS 3:COLOR 1,5
1390 SCREEN 1,1
1400 LINE (16,36)-(16,144),PSET
1410 LINE (50,36)-(50,144),PSET
1420 LINE (16,90)-(50,90),PSET
1430 CIRCLE(78,124),20
1440 LINE(104,36)-(104,144),PSET
1450 CIRCLE(124,124),20
1460 LINE(150,36)-(150,144),PSET
1470 CIRCLE(170,124),20
1480 LINE(199,104)-(199,144),PSE
T
1490 LINE (208,36)-(208,144),PSE
T
1500 LINE (190,70)-(226,70),PSET
1510 PUT (194,88)-(204,98),HB
1520 RETURN
```

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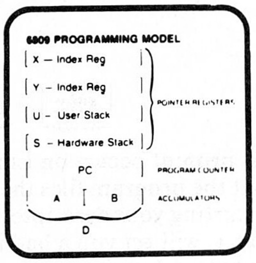

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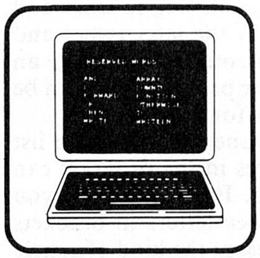

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Information Access...

Capture *the Rainbow*

—And Access The Gold

A Raindex-created index to the Rainbow's first nine issues can be found on page 184.

By M.P. Wilson

16K
ECB

My feelings upon reading my first copy of *the Rainbow* must have been similar to that of many first-time readers: I could not wait to get the back issues and have a full file of Color Computer information at my fingertips. A quick phone call to the friendly *Rainbow* staff got me the whole stack in just four days.

I sat down to read and take notes, but by the time I got to Issue No. 10, I recognized that my pad and paper just could not keep up with the information I was trying to trace and sort out. I skimmed through some of the later issues and found no annual index. Thus, I wrote RAINDEX, an indexing, alphabetizing, note-ordering program that can be used to salt away a file of references for later use.

RAINDEX could be used by anyone who needs to list notes alphabetically—and the features in the program can be employed in many different ways. For instance, if you look at the output listing, you will see letters in brackets attached to the numbers. These represent the kind of article referred to in the index, but when *the Rainbow* isn't peeking, I use that "tag" to identify the different magazines in which I've found articles, rather than the type of article. But we ought to look at the program to first find out what it does, before we start searching out novel ways to use RAINDEX!

The program begins by *CLEARing* a lot of string space. As I only began programming this past summer, I am not sure if the *CLEAR* has to be so big, but it does work.

While the array *DIM'ed* in Line 20 looks as though it has 25 by 100 elements, the Color Computer (I found out through a typing error) actually sets up an array that is one dimension bigger in each direction than was asked for. In this case, the array is actually 26 by 101 elements: the first element being a$(0,0), the last a$(0,100). Anyway, I wanted to save memory space, so I was delighted to learn that I could stuff 26 letters in 25x array.

The last part of Line 20 puts a "top of the file" marker in to tell the program when it has reached the end of a particular file. In this case, they are three up-arrows.

Line 30 gives the first prompt by asking for the Issue and Date. I used *LINE INPUT* so that I could include Punctuation. You might like to change this statement to match your particular note-taking needs.

Line 40 gives another prompt; this time asking for the "tag." The "tag" is a one-letter indicator note I can tag onto the page numbers to tell me what kind of article I am referring to. For instance, (R) means a review; (1), a letter; (P) a program; and (C) a correction. As I said above, if I were indexing more than one magazine or book at a time, I might use the "tag" to tell me which book or magazine the article came from. That is, under those circumstances, (R) might mean *Rainbow*, (C) Color Computer News, and (B) BYTE. You could use the tag anyway you wanted to.

The next and most important prompt occurs on Line 80. The "descriptor" is the word that the program files the note under. Only words can be used; starting your descriptor with a number, or some other character, will get you a bad input message and prompt you for a better descriptor.

From here on, the program has lots of bells and whistles designed to make the filing of notes easier. After a good descriptor is entered, the program alphabetizes it, shows you a set of prompts, and lists the descriptors that come before and after your new one in the files.

The prompts at the top of the screen indicate that the up- and down-arrows will move you through the part of the alphabet that your descriptor was filed in. To return to where your descriptor is supposed to file after using the arrows, simply input a "-"; I especially like that feature, as I have a very hard time putting things back in alphabetical order.

If you decide that you don't want to file the note you have created, inputting a "?" cancels the whole thing and puts you back at the note inputting stage. Or, if you like the note, but decide after flipping through the file with the arrows that you should have used a different descriptor, the "/" input at this point will prompt you for a new descriptor, then refile it for you.

To actually put something in the file (so far we have only been seeing where in the file our note would go) input a "@." I decided to use the "@" instead of a simple *ENTER* because I kept butterfingering the wrong notes into the file.

Speaking of wrong notes, if you do enter something into the file tht you don't want there, just enter an "*." You will be asked for a "D" and a "Q." These are the numbers to the left of the notes bracketing the current one: "D" is the first one and "Q" the second. The program will remove the note with those identifying numbers and return you to the note-taking point. Notice that there are no numbers next to the note you are trying to insert: that's because it's not yet in the file and you can't delete it. It's just not there!

Finally, the occasion might arise where you know you used a descriptor, but just can't remember how to spell it (you might have said "GAMES" instead of "GAME." If you leave the note and tag prompts blank (just hit *ENTER*) and put "g" (or whatever letter you want to look under) in the descriptor; you will now be able to flip through all the entries in the file under "g" (or whatever) by using the up- and down-arrows.

The program, by printing each note out as it is entered, permits you to also leaf through the printout to find the term you are looking for. I find both methods equally useful under different circumstances.

By the way, the program will tack notes together that have been filed under the same descriptor. If you were trying to

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keep your dates' phone numbers in order, you could put them under the person's name. Later, if you wanted to add some other information about your date (I won't say what, I'm not nosey), type the note and use the person's name as a descriptor again. The phone number and the other information will file together under the person's name.

But retyping a long list gets wearysome, so the program lets you print out your file in alphabetical order, or record it on tape. Typig an up-arrow at the issue-page prompt gets you to the Print, Record, and Load from tape mode.

In this mode, you will be asked what you want to do. If you want to Print, then the program outputs an alphabetical list to the printer and returns you to the input mode *without clearing the memory.* To clear the memory, re-*RUN* the program.

The Tape and Load function permit you to store your file in alphabetical order on tape, and to load it back in again. You are prompted in both cases to name the file. This feature permits you to use RAINDEX for many different types of files.

That about does it for RAINDEX. I have asked the editors of *the Rainbow* if they would like a more complete index to the magazine than the one listed below. I might also consider, if there were enough, compiling a "Whole Color Computer Bibliography" listing articles about our favorite micro from many different magazines. If *you* would like to see it done, drop me a postcard (Box 794, Potsdam, NY 13676) and I will try to get one together.

The listing:

077A End

```
10 REM     RAINDEX=PEEK(RAINBOW)
           (C) 1982 BY M.P.WILSON
           BOX 794, POTSDAM, N.Y.
            13676      VER 1.4
20 CLEAR15000:DIMA$(25,100):FORX
=0TO25:A$(X,0)="^^^":NEXT:T$=":"
:PRINT:PRINT
30 D$="":PRINT"ISSUE.PAGE ";:LIN
E INPUTZ$:IFMID$(Z$,1,1)="^"THEN
330
40 PRINT"ANY TAG?"
50 J2$=INKEY$:IFJ2$=""THEN50
60 J2=ASC(J2$):IFJ2>13THENJ2$="<
"+J2$+">"ELSEJ2$=""
70 PRINTJ2$
80 PRINT"DESCRIPTOR":LINE INPUT
Z2$
90 T2=0:D$=Z2$+" :"+Z$+J2$:A3=AS
C(D$):D=A3-65:IFD<0THEN T2=1ELSE
IFD>25 THEN T2=1
100 IFT2>0THENPRINT"BAD INPUT, T
RY AGAIN":GOTO30
110 FORX=0TO100:IFA$(D,X)="^^^"T
HEN E=1 ELSE A=INSTR(D$,T$):A2=I
NSTR(A$(D,X),T$):C2$=LEFT$(D$,A)
:C$=LEFT$(A$(D,X),A2):IFC$<C2$TH
EN NEXT ELSE IFC$=C2$ THEN E=2 E
LSE IFC$>C2$THEN E=3
120 Q=X:K3=Q
130 CLS:PRINT"^-STRT DN^-END --R
TN ?-CNC /-DES *-DEL":IFK3<0THEN
K3=0ELSEK3=K3
140 IFK3>0THENPRINTD;",";K3-1;"
"A$(D,K3-1) ELSE PRINT"start of
file"
150 IFK3<10THENK4=8ELSEK4=9
160 C4$=C$:IFC4$=C2$ THEN170ELSE
PRINTSTRING$(K4," ");D$:GOTO180
170 IFC4$=""THENPRINTSTRING$(K4,
"  ");D$ELSEPRINTSTRING$(K4,"*");
D$
180 IFK3<100THEND2$=A$(D,K3)ELSE
 D2$="end of file"
190 IFD2$=""THEND2$="past ^^^ ma
rker"
200 PRINTD;",";K3;" ";D2$
210 J$=INKEY$:IFJ$=""THEN210
220 IFJ$="^"THENK3=K3-1:GOTO130
230 IFJ$=CHR$(10)THENK3=K3+1:IFK
3>99THENK3=99ELSEK3=K3:GOTO130
240 IFJ$="-"THENK3=Q:GOTO130
250 IFJ$="?"THEN30
260 IFJ$="/"THEN PRINT"CORRECT D
ESCRIPTOR":INPUTZ2$:GOTO90
270 IFJ$="*"THENPRINT"DELETE ITE
M IN FILE.":INPUT"ENTER D";D:INP
UT"ENTER Q";Q:FOR Y=Q TO 99:A$(D
,Y)=A$(D,Y+1):NEXT:GOTO30
280 IFJ$="@"THEN ON E GOTO 290,3
00,310 ELSE 210
290 A$(D,Q+1)="^^^":A$(D,Q)=D$:G
OTO320
300 C3$=RIGHT$(D$,LEN(D$)-A):A$(
D,Q)=A$(D,Q)+" "+C3$:GOTO320
310 FORX=99TOQ STEP-1:A$(D,X+1)=
A$(D,X):NEXT:A$(D,Q)=D$
320 PRINT#-2,A$(D,Q):GOTO30
330 AUDIO ON:INPUT"R-TAPES L-LOA
DS P-PRINTS ^-CANCL";R$:IFR$="^"
THEN30 ELSE IFR$="P"THEN430ELSEI
NPUT"DATA FILE NAME <LIMIT IS 8
CHAR>";G$:IF LEN(G$)>8THEN330ELS
EIFR$="L"THEN370ELSEIFR$="R"THEN
340ELSE330
340 OPEN"O",#-1,G$
350 FORX=0TO25:FORY=0TO100:IFA$(
X,Y)<"^^^"THENPRINT#-1,A$(X,Y):N
EXTY
360 PRINT#-1,A$(X,Y):Y=0:NEXTX:C
LOSE#-1:GOTO30
370 OPEN"I",#-1,G$
380 K=0:J=-1
390 IF EOF (-1) THEN420
400 INPUT#-1,G$:PRINTG$:J=J+1:A$
(K,J)=G$:IFG$="^^^"THEN K=K+1:J=
-1:GOTO390
410 GOTO390
420 CLOSE#-1:GOTO30
430 FORX=0TO25:FORY=0TO100:IFA$(
X,Y)<"^^^"THEN PRINT#-2,A$(X,Y):
NEXTY
440 IFA$(X,Y)="^^^"THEN Y=0:NEXT
X
450 GOTO30
```

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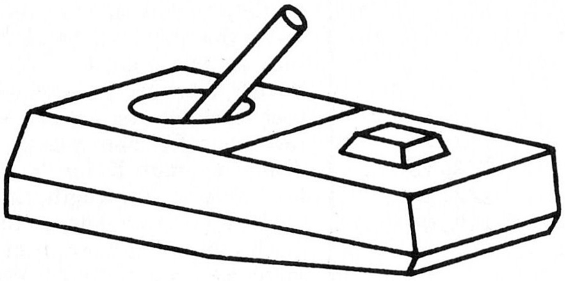

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Science...

A Staggering Proposition (With Sobering Implications)

by R. Delbourgo

Picture to yourselves the following scene: a drunkard, having drained his last bottle, is standing under a lamppost in the middle of a park. He is full of alcohol and must now totter home (or to the nearest liquor store to acquire another bottle!) As you can imagine, his step is far from sure and he walks this way and that, quite randomly in fact. Each step that he takes moves him sometimes nearer, sometimes farther, from his starting-point and one wonders if he will ever reach his destination! After 100 steps, say, the effort is too much for him and he collapses on the ground in a drunken stupor. If, for the sake of argument, each stride of his is one foot in length, the question is,

"How far away is he, on the average, from the lamppost?"

This intriguing poser is met in many areas of science and mathematics, in different and fancier guises. It goes under the general heading of Brownian Motion or Stochastic Processes. (It was the botanist, Brown, who first observed this random motion microscopically by studying the behavior of pollen particles suspended in water and noticing how they were buffetted about by collisions with water molecules, themselves too small to be seen.) There are far-reaching scientific implications in the random walk problem, but it is not the object of this article to describe any of these. Rather, I hope to tempt you into experimenting on the problem yourselves to see if you can discover the practical answer to this question with the help of your friendly 80C.

There is of course a classical theoretical answer; it is that the *average* distance traveled by the drunkard goes up as the *square root* of the total number of steps. Put more simply, he is likely to be only 10 feet from the lamppost after 100 strides; eight feet after 64 strides, and so on. I will spare you the proof of this remarkable prediction (you can find it in textbooks anyway) but you must appreciate that the theoretical answer refers to the *probable* distance covered. In any particular walk our sozzled fellow may actually cover more ground or less ground than the theoretical prediction. Therefore, before you reach any conclusions from your own experiments with the 80C, repeat the experiments several times to find out the drunkard's mean range. The 80C is a marvelous help this way. We will ask it at one and the same time to act as the drunkard, to show us where he is, to plot out the motion, to assess the results of successive experiments and to compare experiment with theory. What more can you ask of it?

For our first experiment let us suppose that our drunkard has a sense of direction and that he is sober enough to move along an east-west path. Also suppose his stride is two feet instead of one foot as above (you will see the reason for this presently when we come to variations on the theme). We will ask the 80C to take 64 steps, measure out the distance and plot the results out nicely for our inspection. The drunkard's position can be set out as a PPOINT(X,Y) on the screen with X=128 being taken as the location of the lamppost. X increases or decreases randomly by two with each stride and, to make the location more visible, let us increase Y by three for every step. Listing 1 below shows how to program all of this:

#1	0372	End
#2	0388	End

16K

```
1 POKE359,13:SCREEN0,1:CLS(RND(9
)-1)
2 FORS=0TO3:PRINT@14+I+S*96,"THE
```

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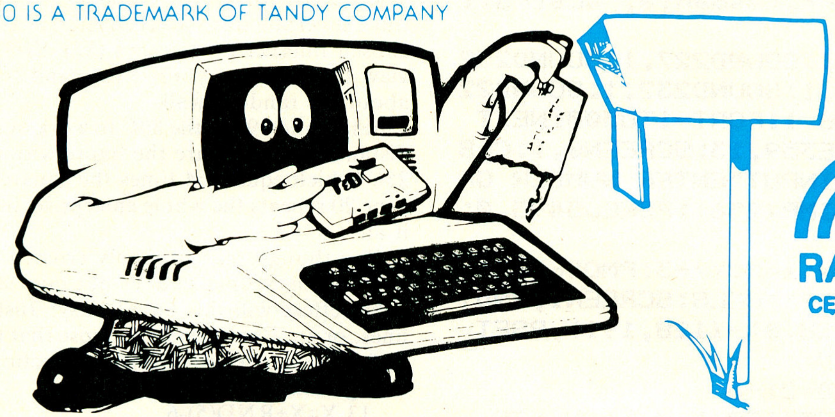

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```
";:I=I+4*RND(2)-6:PRINT@46+I+S*9
6,"RANDOM";:I=I+4*RND(2)-6:PRINT
@78+I+S*96,"WALK";:I=I+4*RND(2)-
6:NEXTS
3 PRINT@426,"r&d.delbourgo";:PRI
NT@456,"15,willowdene av.";:PRIN
T@481,"hobart,tasmania, australi
a7005";
4 SOUND218,1:SOUND227,1:SOUND232
,1:SOUND239,1:SOUND232,1:SOUND22
7,1:SOUND218,1:FORT=1TO500:NEXT
10 N=64:POKE359,13:SCREEN0,1:CLS
(RND(9)-1):INPUT"ENTER NUMBER OF
 WALKS";W:DIMP(256):POKE65495,0:
POKE359,126
11 FORM=1TOW:X=0:Y=-3:PMODE3,1:C
OLOR5,RND(3)+1:PCLS:SCREEN1,RND(
2)-1:LINE(128,0)-(128,191),PSET
12 FORS=1TON
13 X=X+4*RND(2)-6
14 Y=Y+3:PSET(128+X,Y,5):NEXTS
15 SOUND150,5:X=X+128:P(X)=P(X)+
1:NEXTM
16 PMODE3,1:PCLS:SCREEN1,RND(2)-
1:COLOR3,5:LINE(128,0)-(128,191)
,PSET:LINE(0,191)-(255,191),PSET
17 FORX=68TO188STEP4:C=X/4-2*INT
(X/8):FORI=0TO7:COLOR2*C,5:LINE(
2*X-132+I,191)-(2*X-132+I,191-20
0*P(X)/W),PSET:NEXTI,X
18 FORX=0TO255:L2=(X-128)*(X-128
)*P(X)+L2:NEXTX
19 CLS:PRINT"YOU HAVE WALKED A M
EAN SQUARED  DISTANCE"L2/W:PRINT
"":PRINT"(THE THEORETICAL ANSWER
 IS 256)"
20 POKE65494,0:FORT=1TO5000:NEXT
T:RUN10
```

The title Lines 1-4 give a flavor of the goodies to follow.

Line 10 stipulates that the total number of steps (N) is always 64 in this particular experiment. It also allows you to choose how many walks you want the drunkard to take. Make W bigger than five or so if you want meaningful statistics, but keep W less than about 50 unless you are not easily bored.

Lines 11-15 provide you with a picture of the drunkard's position with respect to the lamppost (the central line on the screen). Notice the combination 4*RND(2) - 6 in line 13 to give you +2 or -2 with equal chance.

In Line 15 the computer counts how many times the drunkard, P(X), reaches the final location (X) where the poor man collapses.

The purpose of Lines 16 and 17 is to graph the number of times a certain distance is covered after 64 steps, given your chosen number of journeys (W). SHIFT@ if you want to view the graph at your leisure and form your deductions about the random walk.

Lines 18 and 19 tell the 80C to work out the average squared distance and compare the figure with the theoretical result 256 (which equals 64 times the square of two).

Line 20 repeats the whole enterprise; break when you tire of it all.

One thought has probably crossed your minds already. What if the drunkard does not take steps of equal length? What effect will this have? Easy! Just change a couple of lines, or so. For instance suppose that the steps are likely to be 0,2,4 feet in length, in either direction. In that case simply change Line 13 to

```
13 X=X+RND(5)-6
```

and substitute 512 for 256 in the theoretical value in Line 19. (Why 512? Because it is 64 times the mean of 4*4, 2*2, 0*0, 2*2, 4*4, the squared distances of his possible strides.) Alternatively you might conceive that the drunkard can take integer steps from 0 to 4, east or west. Use instead

```
13 X=X+RND(9)-5
```

and, because he now covers integer distances, change Line 17 to

```
17 FORX=66TO190:C=X-2*INT(X/2):FORI=0TO3:-
COLOR2*C,5:

ET:
NEXTI,X
```

Also, the theoretical answer in Line 19 is about 427; see if you can figure out why. If you want decent statistics here make him go 20 walks at least!

Maybe you are wondering why the total number of steps (N) has to be fixed at 64 in line 10. Well, it does not need to be. You can make less than 64 to stay on the screen (or else you will need to radically alter some other lines in the program); and don't forget to change your theoretical value in Line 19 proportionately.

A more interesting variation of the one-dimensional walk (yes, that's the jargon phrase for it) is to increase N systematically. This is what I have attempted in the next Listing (A). Lines 1 to 4 and Line 20 stay as they are, but the remaining lines are changed as follows:

```
11 PRINT"THE COMPUTER WILL NOW C
ARRY OUT AN EXPERIMENT. IT WILL
UNDERTAKERANDOM WALKS OF 8,16,24
,..,64   STEPS AND IT WILL PRINT
 OUT THE POSITION AS EACH WALK P
ROCEEDS. THEN IT WILL PLOT THE D
ISTANCE  TRAVELLED D AGAINST THE
 TOTAL     ";
12 PRINT"NUMBER OF STEPS N.":INP
UT "ENTER THE NUMBER OF TIMES YO
U    WANT THE EXPERIMENT TO BE DO
NE";E:PRINT"":DIMP(E,8)
13 FORM=1TOE:FORN=1TO8:X=0:FORS=
1TO8*N
14 X=X+4*RND(2)-6
```

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```
15 PRINTX;:NEXTS:PRINT"":P(M,N)=
ABS(X):PRINT"THE TOTAL DISTANCE
TRAVELLED      AFTER"8*N"STEPS WAS
"ABS(X):PRINT"":SOUND16*N,15:NEX
TN,M
16 POKE359,126:PMODE1,1:PCLS:SCR
EEN1,RND(2)-1:COLOR3,5:LINE(0,0)
-(0,191),PSET:LINE(0,191)-(255,1
91),PSET:DRAW"BM12,12;C4;U8F8U7"
:DRAW"BM240,184;C4;U8R4F2D4G2L4"
17 FORM=1TOE:FORN=1TO8:CIRCLE(6*
P(M,N),192-24*N),M,2:NEXTN,M
18 FORX=1TO95:PSET(X,191-X*X/47.
5,4):NEXTX
```

In this second set of experiments the computer increases N in steps of eight up to 64 and, just for a change, it prints out the position as the walk proceeds. In line 12 you have the option of choosing the number of times the 80C should repeat this sequence.

Lines 16 and 17 are quite new; they are used to plot the distance (D) along X, against the number of strides (N) along Y every time the experiment is run. The results feature as a cluster of points/circles. For comparison, the theoretical curve is drawn in line 18; all being well, it should run through the cluster. Again, you are at liberty to vary the strides by changing Line 14 as described before. At the same time remember to adjust the theoretical curves in line 18. One suggestion: don't repeat the experiment too often (make E less than about 10) or you will get fed up waiting for the results!

Of course, the experiments so far are quite unreal. Who ever heard of a drunkard tottering in one direction! He is, of course, just as likely to stagger in other directions than an east-west line. This brings us to the two-dimensional random walk (apologies for the jargon!). Listing 2, next, will literally broaden our horizons. Lines 1,3,4,20 are the same as in Listing 1. The new line 2 gives an inkling of what is to come.

```
1 POKE359,13:SCREEN0,1:CLS(RND(9
)-1)
2 PRINT@207," ";:FORS=1TO10:K=2*
RND(2)-3:I=I+2*K:PRINT@207+I+J,"
 ";:PRINT@207+I+J-K," ";:SOUND18
0,1:J=J+64*RND(2)-96:PRINT@207+I
+J," ";:SOUND210,1:NEXTS:PRINT@8
,"THE RANDOM WALK";
3 PRINT@426,"r&d.delbourgo";:PRI
NT@456,"15,willowdene av.";:PRIN
T@481,"hobart,tasmania, australi
a7005";
4 SOUND218,1:SOUND227,1:SOUND232
,1:SOUND239,1:SOUND232,1:SOUND22
7,1:SOUND218,1:FORT=1TO500:NEXT
10 N=64:POKE359,13:SCREEN0,1:CLS
(RND(9)-1):INPUT"ENTER NUMBER OF
 WALKS";W:DIMP(656):POKE65495,0:
POKE359,126
11 FORM=1TOW:X=0:Y=0:PMODE1,1:CO
LOR5,RND(3)+1:PCLS:SCREEN1,RND(2
)-1
12 FORS=1TON
13 PI=3.1415926:D=8:A=PI*RND(2*D
)/D:L=5
14 X=X+L*COS(A):Y=Y+L*SIN(A):PSE
T(X+128,Y+95,5):NEXTS
15 SOUND150,5:R=INT(SQR(X*X+Y*Y)
):R=R+1:P(R)=P(R)+1:NEXTM
16 PMODE3,1:PCLS:SCREEN1,RND(2)-
1:COLOR3,5:LINE(0,191)-(255,191)
,PSET
17 FORK=1TO127:C=K-2*INT(K/2):FO
RI=0TO1:COLOR2*C,5:LINE(2*K+I,19
1)-(2*K+I,191-400*P(K)/W),PSET:N
EXTI,K
18 FORR=0TO255:L2=R*R*P(R+1)+L2:
NEXTR
19 CLS:PRINT"YOU HAVE WALKED A M
EAN SQUARED  DISTANCE"L2/W:PRINT
"":PRINT"(THE THEORETICAL VALUE
IS 1600)"
20 POKE65494,0:FORT=1TO5000:NEXT
T:RUN10
```

A few explanations: In line 13, D represents the number of directions which the drunkard can take; in principle these could be infinitely many. You may feel that I was silly to choose D=8. If so, you are welcome to select your own value of D (but I think D=18 should be ample). For the moment, run the program as it is.

Notice that the length L of each stride has been made *five*, rather than *two*. This is just so that the locations can show up more clearly on your screens.

Line 14 *PSETs* the location; Line 15 works out the distance (R) from the lamppost and counts the number of times the distance is reached via P(R). Lines 16 and 17 serve the same purpose as in Listing 1, only this time the origin of the graph is at bottom left, not in the middle. Lines 18 and 19 compare your results with hypothetical expectations.

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Feel free to vary your drunkard's stride. For example make L=RND(9) in Line 14 (still giving him an average stride of five units) and amend your theoretical answer in Line 18 to 2027. Or else you could take

L=RND(5)+RND(5)-1

which provides a theoretical average of 1856. And so on and so forth. Experiment for yourselves -- this is the whole point of the exercise.

Last but not least, you might care to find out how the average distance depends on the total number of steps taken. Change Lines 10-19 in Listing 2 to those of Listing B:

```
10 POKE359,13:SCREEN0,1:CLS(RND(
9)-1):POKE65495,0
11 PRINT"THE COMPUTER WILL NOW C
ARRY OUT AN EXPERIMENT. IT WILL
UNDERTAKERANDOM WALKS OF 8,16,24
,...,64   STEPS AND IT WILL PRINT
 OUT THE POSITION AS EACH WALK P
ROCEEDS. THEN IT WILL PLOT THE D
ISTANCE  TRAVELLED D AGAINST THE
TOTAL    ";
12 PRINT"NUMBER OF STEPS N.":INP
UT "ENTER THE NUMBER OF TIMES YO
U   WANT THE EXPERIMENT TO BE DO
NE";E:PRINT"":DIMP(E,8)
13 FORM=1TOE:FORN=1TO8:X=0:Y=0:F
ORS=1TO8*N
14 PI=3.1415926:D=8:A=PI*RND(2*D
)/D:L=5:X=X+L*COS(A):Y=Y+L*SIN(A
)
15 PRINTINT(X);:PRINTINT(Y);:PRI
NT"  ";:NEXTS:R=INT(SQR(X*X+Y*Y)
):P(M,N)=R:PRINT"":PRINT"THE TOT
AL DISTANCE TRAVELLED    AFTER"8
*N"STEPS WAS"R:PRINT"":SOUND16*N
,15:NEXTN,M
16 POKE359,126:PMODE1,1:PCLS:SCR
EEN1,RND(2)-1:COLOR3,5:LINE(0,0)
-(0,191),PSET:LINE(0,191)-(255,1
91),PSET:DRAW"BM12,12;C4;U8F8U7"
:DRAW"BM240,184;C4;U8R4F2D4G2L4"
17 FORM=1TOE:FORN=1TO8:CIRCLE(3*
P(M,N),192-24*N),M,2:NEXTN,M
18 FORX=1TO120:PSET(X,191-X*X/75
.5,4):NEXTX
```

and play with variations on these. I do hope that these experiments will stimulate you into reading more about the subject, and discovering the importance of the random walk for the development of scientific theories about the nature of heat. In any case, I trust you will have some fun with these programs.

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Hardware Review...

This Paddle For The CoCo Works Just Fine

So, maybe, I am not as smart as I think (you knew it all the time, of course).

What's the difference between a paddle and a joystick? I asked when one of them arrived recently in the mail for review.

Well, a joystick lets you make moves up and down, left and right. You can go anywhere. It's essential for the Pac Man-like games because you want to move all over the screen.

But the paddle? Well, it lets you go right to left, left to right. But no up and down. So, what's the use, really? The joystick gives you both of these movements at once.

"Just try it with *Astro Blast*," Bob Rosen, who sells this thing, *the Spectrum Paddle*, asked. You'll see.

So I did. And I did.

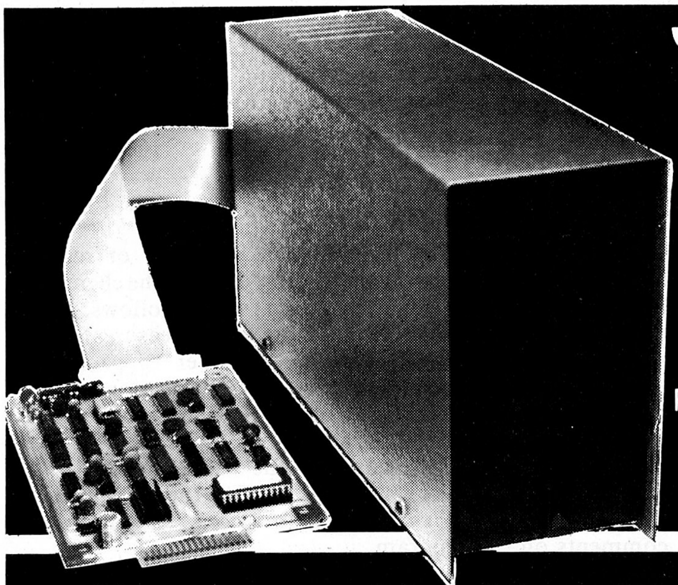
The response on this thing is excellent. I confess to not understanding the electronics of it, but it seems to me that all the "extra" that went into worrying about the up and down locations now is addressed to the side to side. This gives you the ability to make little bitty movements with your paddle—so very important when trying to peek out from behind a barrier and zap an alien. You can move quickly, slowly or just sit there. You do have a better control of the right to left movement than with any *joystick we have seen so far. Bar none.*

The Spectrum Paddle comes in a high-impact plastic case and is extremely well put together. It's an attractive light brown and, I would say, is better than the "Paddles" I got with my Atari game machine several years ago. The fire button gives quick response.

Finally, I did better than usual on *Astro Blast*. And on *Space Invaders*, too.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421, $19.95 plus $2 s/h)

—Lonnie Falk



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Lecture Graphics: Chemical Bonding Simulation

By Lane P. Lester

16K
ECB

While of professional use to few of our readers, the following article and listing is both an interesting glimpse into atomic structures and chemical bonding, and an excellent example of the use of computer programming as a graphics aid for instructional purposes in general.

The bold graphics of the Color Computer offer the teacher a tool in computer-aided instruction that has not yet been fully explored; namely, lecture graphics. While some concepts can be best illustrated with the use of the chalkboard, overhead transparencies, 35mm slides, or 16mm film, other concepts can be discussed with enhanced clarity by the use of computer graphics synchronized with the teacher's oral presentation. A major breakthrough in the development of lecture graphics occurred with the invention of *Motion Picture Programming* by the late Arnold Pouch. This technique has eliminated most of the tedium of programming graphic presentations in Basic and is available commercially from Superior Graphic Software (reviewed in *the Rainbow*, July, 1982). Arnold also unselfishly made the MPP technique available free by publishing it in the March and April, 1982, issues of *the Rainbow*.

Most courses in general biology include a discussion of simple concepts in chemistry, since so much of recent research has concentrated on the study of life at the chemical level. *CHEMBOND*, the program which follows, was developed for use in explaining some basic ideas in atomic structure and chemical bonding. In order to pace the execution of the program to match my discussion of the topic, the joystick and fire button provide a convenient remote control. *CHEMBOND* was developed before the invention of MPP and contains the usual multitude of screen locations in *DATA* statements. The following "table of contents" provides both instructions for use and comments on the program.

CHEMBOND Table of Contents

1. TV Calibration Routine (Lines 50-70)

This is a frequently-used routine that displays bars of all eight colors so that the controls of the television can be adjusted for optimum classroom viewing. Line 70 illustrates the need to call JOYSTK(0) before one can call JOYSTK(1).

(Move stick forward to advance)

2. Biology Title (Lines 80-360)

In all of my lecture graphics I have begun each presentation with some kind of title that includes some attractive graphics to stimulate interest. I start this routine several minutes before class is scheduled t start, and the students can see it as they come into the room. Several of the magazines which support the Color Computer have printed programs that produce "pretty pictures" of one kind or another and these can be used with or without the addition of graphic characters announcing the topic.

(Move stick forward to advance)

3. Hydrogen Atom (Lines 370-390)

(Move stick back and press button to show)

The hydrogen atom, with its single proton and electron, serves to introduce atomic structure. The orbital of the electron is randomized to illustrate the electron cloud idea.

(Move stick forward to advance)

4. Atomic Shells and Fluorescence (Lines 400-470)

(Move stick back and press button to show)

a. Shells—The concentric partial circles illustrate the different energy levels that electrons can occupy.

(Press button)

b. Inner electrons—This simulates electrons orbiting in the next to outermost shell.

(Press button)

c. Outer electrons—A flash of yellow illustrates the input of energy required to drive an electron to a higher shell.

Press button to illustrate fluorescence
or
move stick forward and press button to advance

5. Covalent Bond (Lines 480-540)

(Move stick back and press button to show)

The formation of the diatomic hydrogen molecule is used to illustrate the concept that sharing electrons allows two

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Alphabetizes
Sorts Numeric Entries
Searches for key words or numbers
Computes totals and averages
by catagories.
Saves Records, changes or deletes them
Output to **Screen, Printer** or **Tape.**
Print all or selected records.
+, −, X, ÷ Numeric Entries.
Owners Manual included with sample files
16K, 32K, Memory Expandable
Extended Basic Required.

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Software

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CA Residents Add 6% Sales Tax
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SOFTWARE
A DIVISION OF MORETON BAY LABORATORY
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(805) 962-3127

FIRST ANNIVERSARY SPECIAL

That's right people, we have been in business for one year. Hence we are having a first Anniversary special. Snake Mountain Software is pround to announce a new line of products. We are going into the cartridge business. Our cartridges are very similar to Radio Shack's cartridges. Prices good through Jan. 31, 1983.

PROGRAMS

An enhanced version of the Solution on a cartridge. $29.95

HARDWARE

A cartridge case and PC board with a socket. Accepts either a 2716 or 2732.

CUSTOM CARTRIDGES

You send in a program, we send you back a cartridge with a program in it. We can do either Basic or ML programs. Prices start at $19.95. Send for complete details.

GRAPH LABEL

Have you ever wanted to place characters on a graphic screen but couldn't find an easy way to do it Well then **GRAPH LABEL** is for you This program will enable you to place characters anywhere on a graphic screen. It will place any of 96 ASCII characters on the screen or you may create your own characters. It features a cursor that may be moved anywhere around the screen with out rubbing out what it goes over. Superscripts and subscripts may be used since the cursor may be moved vertically and horizontally in steps as small as one pixel Lowercase characters have descenders **GRAPH LABEL** is written in Basic and is therefore easy to modify. It may be used by itself or as a subroutine.

$8.95

PILOT is a language which enables people with little knowledge to write educational programs The language uses simple one or two letter commands for program functions.

SUPER PILOT

An enhanced version of Pilot for use with Extended Basic. Includes features for math, graphics, and sound. Has a feature that makes it easy to create flash card type drill programs. Programs are pseudo compiled for faster execution. Comes with as 24 page tutorial manual and demo programs Sample program included on tape to get you started **$12.95**

SCRIPTFIX

An ML program that enables Color Scripsit to have true upper and lower case characters—none of the reversed upper case characters. Features solid green background and all normal Scripsit functions. No decrease in typing speed. Please specify your machine type when ordering. **$9.95**

DISCOUNT — order **10** or more programs (you may mix types) and you will receive a 30% discount on the order. **Dealer** discounts are also available.

SNAKE MOUNTAIN SOFTWARE
P.O. BOX 5722
RALEIGH, NC 27650

Congratulations

you made the right choice when you purchased a Color Computer. It is a very powerful machine. However the standard display format does not do the machine justice. The machine is capable of much more than 16 lines of 32 all capital characters. Now you can give your Color Computer the display it deserves **THE SOLUTION** gives the Color Computer a much better display than it normally has, and really makes the machine shine Its features include:

- provides a screen of **42 characters** by **21** lines displayed
- linked directly to basic — program is transparent to the user
- prints all 96 ASCII characters, lowercase characters have descenders, has a slashed **zero** to avoid confusion when programing
- prints characters on any two-color graphic screen
- graphics and text may be intermixed on the same screen
- special mode with 4 lines of text at the bottom of the screen (just like some other famous color machines) — great for working with graphics
- large character mode for small children or the visually impaired
- character set may be reversed
- written in machine language, program is relocatable
- fast — prints at over 600 characters per second
- works with both cassette and disk
- includes a 20 page manual with demo programs (a lunar lander program is included)

SOLUTION $14.95

EXTENDER

Still want more than 42 characters per line from your computer Then the **EXTENDER** is for you This program when used with **THE SOLUTION** will give a display of **51** characters per line by 21 lines displayed Please include your program serial number when ordering **$7.95**

SCREEN PRINT PACKAGE

A package of 2 programs for use with the LPVII, LPVIII, DMP100, DMP200, DMP400, DMP500 The programs will print an image of what is on a graphic screen to the printer Both programs work with all the standard PMODEs The programs are written in machine language and may be moved anywhere in memory. The two programs are

1) **SCREEN PRINT** — will produce a regular size print The image may be located anywhere on a page

2) **DOUBLE SIZE SCREEN PRINT** — this program will produce a full size image that will fill up a sheet of paper The finished product is 8 by 6.5 inches in size Your computer graphics look really good when they are printed out with this program. **$4.95**

All programs for 16K, 32K Extended Basic machines unless otherwise noted All programs on cassette Add $4.00 per order for disk.

SHIPPING — add $2.00 for orders less than $20.00 Shipping is **free** on orders of more than $20.00.

Canadians — please send money orders only

Phone C.O.D. orders accepted.

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atoms to achieve a stable number of electrons.

a. Hydrogen atom with moving electron
(Press button)

b. Hydrogen atom with stationary electron
(Press button)

c. Two hydrogen atoms with stationary electrons
(Press button)

d. Two hydrogen atoms sharing electrons
Press button to repeat
or
move stick forward and press button to advance

6. Ionic Bond (Lines 550-750)
(Move stick back and press button to show)

The formation of sodium chloride serves to demonstrate the complete transfer of electrons as a means of achieving a stable number.

a. Sodium and chlorine atoms
(Press button)

b. Formation of ionic bond
Press button to repeat
or
move stick forward and press button to advance

7. Hydrogen Bond (Lines 760-790)
(Press button to show)

This simulates the water molecule in which the shared electrons spend more time orbiting around the oxygen than the hydrogens. This produces the polarity of the molecule that makes hydrogen bonding possible. I'm not satisfied with this one, but I've never gotten around to doing more with it.

(Move stick forward to advance)

PLANETARIUM

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FEATURES

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★ 33 Constellations ★ Moon Phases ★
★ 21 First Magnitude Stars ★
★ Day or Night Skys ★
★ Nine Planets ★ Celestial Equator ★
★ Any Northern Latitude ★
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A.D. 0 to A.D. 10,000 ★

BEST

Astronomy Package for the Color Computer
16-K Extended Basic $16.95 postage paid
CA Residents Add 6% Sales Tax

Moreton Bay Software

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Santa Barbara, CA 93101
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Color Computer TRS 80 ® Tandy Corp.

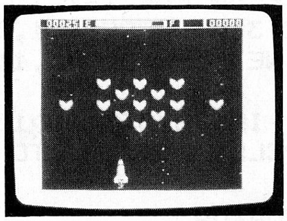
8. Random Circles and Lines (Lines 800-830)

This is a version of a somewhat classic random graphics routine which I consider preferable to a blank screen as an end to the presentation.

The listing:

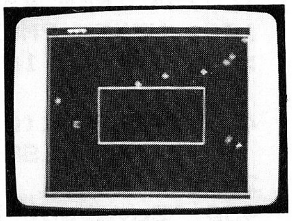
1390 End
0947 500

```
10 'CHEMical BONDing
20 'Lane P. Lester
30 'Liberty Baptist College
40 'Lynchburg, VA 24506
50 'Calibrate
60 CLS 0: FOR ROW=0 TO 15: FOR C
OL=0 TO 31: P=143+16*INT(COL/4):
 POKE 1024+32*ROW+COL,P: NEXT CO
L,ROW
70 X=JOYSTK(0): IF JOYSTK(1)>10
THEN 70
80 'Biology Title
90 CLS 0: PCLEAR 8: PMODE 3,1
100 J=128+16*(RND(8)-1)+RND(15):
 FOR I=1088 TO 1119: POKE I,J: N
EXT: FOR I=1471 TO 1440 STEP -1:
 POKE I,J: NEXT: CLR=RND(8)-1
110 READ I,J: IF I<>0 THEN POKE
I+5*32+1,128+16*CLR+J: GOTO 110
120 DATA 1056,14,1057,12,1058,12
130 DATA 1059,10,1088,11,1089, 3
140 DATA 1090, 3,1091,10,1120,10
150 DATA 1123,10,1152,12,1153,12
160 DATA 1154,12,1155, 8,1061,10
170 DATA 1093,10,1125,10,1157, 8
180 DATA 1063,14,1064,12,1065,12
190 DATA 1066,10,1095,10,1098,10
200 DATA 1127,10,1130,10,1159,12
210 DATA 1160,12,1161,12,1162, 8
220 DATA 1068,10,1100,10,1132,10
230 DATA 1164,12,1165,12,1166,12
240 DATA 1167, 8,1073,14,1074,12
250 DATA 1075,12,1076,10,1105,10
260 DATA 1108,10,1137,10,1140,10
270 DATA 1169,12,1170,12,1171,12
280 DATA 1172, 8,1078,14,1079,12
290 DATA 1080,12,1081, 8,1110,10
300 DATA 1142,10,1144,12,1145,10
310 DATA 1174,12,1175,12,1176,12
320 DATA 1177, 8,1083,10,1086,10
330 DATA 1115,11,1116, 3,1117, 3
340 DATA 1118,10,1148, 5,1180, 4
350 DATA 0,0
360 X=JOYSTK(0): IF JOYSTK(1)>10
 THEN FOR L=1 TO 1000: NEXT: CLS
0: RESTORE: GOTO 100 ELSE CLS 0:
 FOR I=1 TO 200: NEXT
370 'Hydrogen Atom
380 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 380 ELSE PCLS:
 SCREEN 1,0: CIRCLE(128,96),6,3:
```



ASTRO BLAST

Your routine space patrol in an outer galaxy sector becomes a life and death struggle with alien invasion forces advancing towards Earth. Wave after wave of attack squadrons challenge your joystick and fire button skills in this super hi-res machine language shoot-em-up game. One or two players.
Tape version........... **$24.95**



SPACE RACE

Maneuver your ship around the four cornered "race track" in space while destroying hordes of alien ships. As you fly around the "race track" bouncing off the walls, watch out for mines laid by the swarmers. Great color and sound and a new approach.
Tape.................... $21.95

SAVE 10, 15, 20%

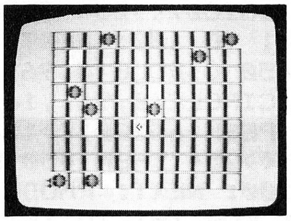
This starts the first time we have published a top ten for the color computer. We have printed a top ten for the Model I/III in 80 Micro for the past year. We have a panel of arcade players who send us a list each month of their favorite 10 games. These are compiled and the Computer Shack top ten is the result. We are still looking for some additional members for our panel. If you are interested please send us a copy of your favorite top ten games. If you are a publisher and have a new game send us a few copies and we will make sure all members of the panel review it.

Computer Shack has been in the publishing business for 2 years publishing software for the TRS-80 Model I and III. We are now expanding into the COCO. If you would like a major publisher to handle your software send us a copy for evaluation. We have full color packaging, and established dealer network, foreign distributors, and have booths at major computer shows throughout the country, etc. We can sell more copies of your programs than any other distributor. If you are a machine language programmer we have some programs that run on the model I and III that we would like to convert to the COCO. If you are interested in this send us a sample of your programming along with your name and address.

Our new 32 page catalog (Model I, III and COCO) is hot off the press. It contains software, hardware, and misc. If you live in the U.S. write now for your free copy. Due to the high cost of mailing, if you live outside the U.S. please send $1.00 for your catalog and we will refund this on your first order.

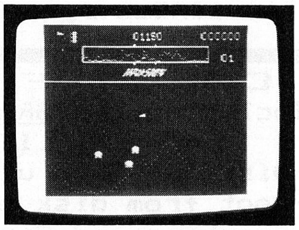
Note our policy of giving a discount for larger orders. We make more money on a big order and we pass the savings along to you. You can save 20% on all your software by buying 4 programs.

SPACE TRADER



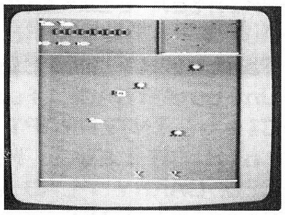
Establish vast interstellar shipping lanes and purchase stock in the companies that control those trade routes. This is a multiplayer board game with graphics. This is a game for the thinkers, it takes more than a quick hand to win this one.
Tape.................. **$21.95**

PLANET INVASTION



A great new Defender action game, its success insured by its spellbinding graphics and marvelous sound, but most of all by its controlability. Using both the keyboard and the joystick, you manuever your way through this revolutionary new game.
Tape.................. **$21.95**

STARFIRE



As you pilot your ship above the peaceful planet, out of nowhere comes a vicious alien attack wave. If they become to numerous for you, try a smart bomb. Keyboard only
Tape or disk.... **$21.95/26.95**

BUGOUT

A compact but very powerful monitor for the 6809 microprocessor.
Only.................. $19.95

MADNESS AND THE MINOTAUR

A classic adventure game utilizing two word commands.
Price.................. **$19.95**

TELEWRITER - 64

Best word processor for COCO.
Tape .... $49.95 Disk $59.95

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```
 PAINT(128,96),3,3
390 X=RND(20)+45: Y=RND(0): CIRC
LE(128,96),X,2,1,Y,Y: CIRCLE(128
,96),X,1,1,Y,Y: X=JOYSTK(0): IF
JOYSTK(1)>10 THEN 390 ELSE PCLS
1: FOR I=1 TO 200: NEXT
400 'Electron Energy Shells
410 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 410 ELSE PMODE
 3,5: PCLS 2: PMODE 3,1: COLOR 2
,3: PCLS: SCREEN 1,0: CIRCLE(0,9
6),8,4,1,.75,.25: PAINT(2,96),4,
4
420 DATA32,.75,.25,64,.75,.25,96
,.79,.23,128,.87,.15,160,.90,.11
,192,.92,.10,0,0,0
430 READ X,Y,Z: IF X<>0 THEN CIR
CLE(0,96),X,2,1,Y,Z: GOTO 430
440 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 440 ELSE FOR I
=1 TO 100: NEXT
450 CIRCLE(0,96),160,3,1,.9,.11:
 CIRCLE(0,96),160,2,1,.9,.11: IF
 PEEK(65280)<>126 AND PEEK(65280
)<>254 THEN 450 ELSE FOR I=1 TO
100: NEXT: PMODE 3,5: SCREEN 1,0
: FOR I=1 TO 10: NEXT: PMODE 3,1
: SCREEN 1,0
460 CIRCLE(0,96),192,3,1,.92,.1:
 CIRCLE(0,96),192,2,1,.92,.1: IF
 PEEK(65280)<>126 AND PEEK(65280
)<>254 THEN 460 ELSE FOR I=1 TO
100: NEXT: PMODE 3,5: SCREEN 1,0
:FOR I=1 TO 10: NEXT: PMODE 3,1:
 SCREEN 1,0
470 X=JOYSTK(0): IF JOYSTK(1)>10
 THEN 450 ELSE PCLS: FOR I=1 TO
200: NEXT
480 'Covalent Bonding
490 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 490 ELSE COLOR
 2,3: PCLS: CIRCLE(128,96),4,4:
PAINT(128,96),4,4
500 X=24+RND(10): Y=RND(0): CIRC
LE(128,96),X,2,1,Y,Y: CIRCLE(128
,96),X,3,1,Y,Y: IF PEEK(65280)<>
126 AND PEEK(65280)<>254 THEN 50
0 ELSE FOR I=1 TO 200: NEXT: CIR
CLE(128,66),2,2
510 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 510 ELSE PCLS:
 A=100: B=96: C=156: CIRCLE(A,B)
,4,4: PAINT(A,B),4,4: CIRCLE(C,B
),4,4: PAINT(C,B),4,4: CIRCLE(10
0,66),2,2: CIRCLE(156,66),2,2
520 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 520 ELSE CIRCL
E(100,66),2,3: CIRCLE(156,66),2,
3
530 FOR I=1 TO RND(5): X=24+RND(
10): Y=RND(0): CIRCLE(A,B),X,2,1
,Y,Y: CIRCLE(A,B),X,3,1,Y,Y: NEX
T: FOR I=1 TO RND(5): X=24+RND(1
0): Y=RND(0): CIRCLE(C,B),X,2,1,
Y,Y: CIRCLE(C,B),X,3,1,Y,Y: NEXT
: IF PEEK(65280)<>126 AND PEEK(6
5280)<>254 THEN 530
540 X=JOYSTK(0):IF JOYSTK(1)>10
THEN 490 ELSE PCLS: FOR I=1 TO 2
00: NEXT
550 'Ionic Bonding
560 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 560 ELSE DIM E
(10,10),B(10,10),X(6),Y(6),Z(6),
U(28),V(28): FOR I=1 TO 6: READ
X(I),Y(I),Z(I): NEXT: FOR I=1 TO
 28: READ U(I),V(I): NEXT
570 DATA 32,.75,.25,64,.75,.25
580 DATA 96,.79,.23,32,.25,.75
590 DATA 64,.25,.75,96,.23,.79
600 DATA   0, 60,  0,122,  0, 28
610 DATA   0,154, 30, 38, 30,145
620 DATA  47, 54, 47,129, 56, 76
630 DATA  56,107, 88, 91,246, 60
640 DATA 246,122,246, 28,246,154
650 DATA 216, 38,216,145,199, 54
660 DATA 199,129,190, 76,190,107
670 DATA 226,  0,226,182,192, 12
680 DATA 192,170,172, 36,172,146
```

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FORTH

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"TRS-80 COLOR COMPUTER PRODUCTS"
"THE 1248-EP EPROM PROGRAMMER"

The 1248-EP EPROM PROGRAMMER is a full function unit that is compatible with virtually all popular 1K, 2K, 4K & 8K -by-8, 24 pin, 5 volt EPROMS. Compatible devices are 2508's, 2758 -0/1's, 2516's, 2716's, 2532's, 68732-0/1's, 68764's, and 68766's. Components 2732, 2732A, 2564, and 2764 are compatible via adapters (not supplied). The programmer is totally menu driven by resident position independent firmware in EPROM, which makes it suitable for experienced computer operators and novices alike.

Select the device type to be programmed from the device menu. Next, select the function to be performed from the function menu. On your command the 1248-EP will verify EPROM erasure, compare EPROM contents to specified contents of RAM or ROM, program blocks or individual bytes of EPROM memory or copy an EPROM's contents to user specified RAM.

The 1248-EP plugs into the cartridge slot of the Color Computer and is invoked by the user with the "EXEC & HC000" BASIC command. The 1248-EP contains its own on-board programming power supply, and has a quality "Zero Insertion Force" socket.

The combination of the TRS-80 Color Computer, an editor/assembler/monitor such as the Micro Works SDS80C** and the 1248-EP EPROM programmer, makes a high performance, cost effective software development station for MC-6800/6809 microprocessor based systems. Use the system to store your own games or utility programs in EPROM's for execution from the cartridge slot using the CK4 PROM/RAM card described below.

The cost of the 1248-EP EPROM PROGRAMMER, instructions and adapter diagrams is just $99.95.

"THE CK4 PROM/ROM CARD"

The CK4 works with 2K, 4K or 8K-by-8 ROM's or EPROM's of the 5 volt only variety in 24 pin packages. In addition, the CK4 may be used with 4 static RAM's such as 6116's to expand the computers memory work space by 8192 bytes. Each of the four on-board sockets can be decoded to any 2K block of the memory map from $C000 through $F800 of the Color Computer. In addition, each socket can be configured to respond to address blocks from 2K to 8K bytes in length, thus accommodating 2K, 4K or 8K-by-8 ROM's, EPROM's or RAM's. ROM and RAM can be mixed on the card as well. RAM, on the card, can be written to and then "write protected" via dip switches on the CK4 to emulate ROM.

The instructions include information on how to set up the socket decoding circuitry and how to provide battery backup for programs stored in CMOS static RAM on the CK4 with the computer off or the cartridge removed.

The popular CK4 PROM/RAM card is now available in three versions.

1) The full featured CK4 remains the standard of cartridge board flexibility with the added capability of providing battery backup for CMOS static RAM's such as 6116's. Cost of the CK4 is still just $29.95.

2) The CK4-1 is a ROM only version of the CK4 card for use with CoCo's with later than "E series" circuit boards. These later versions of CoCo are not able to write to cartridge based RAM without modification. Cost is $27.95 for the CK4-1.

3) The CK4-2 is the unpopulated CK4 series circuit board only. Buy this version of the CK4 and configure them to meet your specific requirements at a price designed to stretch your dollars value. Cost is $15.95 each.

"MORSE ENCODER/DECODER KIT"

The MEDK80 Morse En/Decoder Kit consists of a machine code software driver on tape, a schematic diagram of the interface circuitry, component parts, a printed circuit board (PCB), packaging suggestions and complete instructions for building a Morse code transmission and reception system that is compatible with 4K RAM and up models of the TRS-80 Color Computer. The transmitter/receiver interface circuitry is totally optically isolated and is, therefore, compatible with all receivers and transmitters. Transmitter and receiver both connect to the interface unit and to the Color Computer via the RS-232 port.

The MEDK80 Morse En/Decoder kit operates at speeds up to 70 words per minute and automatically adapts to speed variations of the sender. When transmitting, words are transmitted only when fully formed, i.e., followed by a space, and the transmit text buffer gives visual notification to the operator of what word/character is currently being sent. In addition, the text buffer is 512 characters deep, which is sufficiently large to keep up with the best of "rag-chewers".

Potential purchasers of this product should have previous kit building experience. However, this is not a kit of great complexity, and is well within the abilities of those actively involved in amateur radio or electronic hobbies to construct. To reduce the chance of wiring errors, component placement is indicated on the PCB and detailed assembly instructions are included.

The cost of the MEDK80 software, parts, and instructions is $39.95.

"COCO" GETS A BREADBOARD

The COCO BREADBOARD is a circuit board that plugs directly into the cartridge slot of the Color Computer and provides the user with 16 square inches of predrilled breadboarding area for circuit development, interfacing experiments, motherboard implementation, or whatever your imagination conjures up. The plated thru holes in the breadboard are wirewrap pin compatible and on 0.10 inch centers.

The COCO BREAD BOARD brings all of the data, address, and control signals available at the cartridge slot outside of the body of the computer and the signal lines are appropriately labeled to facilitate error free wiring of breadboards. A ground plane is provided on the top side of the board and solder pads are provided on the bottom of the board, thus facilitating circuit grounding and point-to-point wiring. In short, the COCO BREADBOARD was designed with the experimenter in mind.

The COCO BREADBOARD is attractively priced to justify its use for even the lowest budget projects. It is an ideal vehicle for learning interfacing techniques. Buy extras to have on hand for those rainy weekends.

The COCO BREADBOARD costs just $19.95. Price for two (2) or more is $16.95 each.

FACTORY FRESH COMPONENTS:

ITEM	DESCRIPTION	PRICE
2716 EPROM	2K by 8 Bit, 350 ns	$4.50 ea.
2532 EPROM	4K by 8 bit, 350 ns	$6.50 ea.
6821P	P.I.A.	$3.50 ea.
74LS156	Open collector decoder	$1.70 ea.
Socket	ZIF, 24 pin, Aries	$7.95 ea.

Minimum component order: $25.00

ORDERING INFORMATION:

Add $3.00 to all orders to cover shipping and handling. Allow two weeks for personal checks. Canadian residents add 5% to cover special handling. Arizona residents add 4% sales tax. Sorry! No charges accepted. All items shipped UPS.

Make checks payable to:

COMPUTER ACCESSORIES OF ARIZONA
5801 E. VOLTAIRE DRIVE
SCOTTSDALE, ARIZONA 85254
(602) 996-7569

* TRS-80 is a trademark of TANDY CORP.
** SDS80C is a trademark of the MICRO WORKS.
Prices subject to change without notice.

```
690 DATA 159, 63
700 PMODE 3,5: PCLS 3: CIRCLE(12
8,96),5,2: PAINT(128,96),2,2: GE
T(123,91)-(133,101),E: GET(100,0
)-(110,10),B: PMODE 3,1: PCLS 3:
 SCREEN 1,0: CIRCLE(0,96),8,4,1,
.75,.25: PAINT(2,96),4,4: CIRCLE
(256,96),8,4,1,.25,.75: PAINT(25
4,96),4,4
710 FOR I=1 TO 3: CIRCLE(0,96),X
(I),2,1,Y(I),Z(I): NEXT: FOR I=4
 TO 6: CIRCLE(256,96),X(I),2,1,Y
(I),Z(I): NEXT: FOR I=1 TO 28: P
UT(U(I),V(I))-(U(I)+10,V(I)+10),
E: NEXT
720 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 720 ELSE PLAY"
V10L4O4":PUT(88,91)-(98,101),B:
PUT(98,98)-(108,108),E: CIRCLE(0
,96),96,3,1,.79,.23: PLAY"C": PU
T(98,98)-(108,108),B: PUT(108,10
4)-(118,114),E: PLAY"V12D"
730 PUT(108,104)-(118,114),B: PU
T(118,109)-(128,119),E: PLAY"V14
E": PUT(118,109)-(128,119),B: PU
T(128,113)-(138,123),E: PLAY"V16
F": PUT(128,113)-(138,123),B: PU
T(138,116)-(148,126),E: PLAY"V16
G"
740 PUT(138,116)-(148,126),B: PU
T(148,118)-(158,128),E: PLAY"V18
A": PUT(148,118)-(158,128),B: PU
T(158,118)-(168,128),E: DRAW"C2S
10BM42,26R10BU5BL5D10U5BR35R10":
 PLAY"L4O4V30BO5L32CP6L8CP32L1C"
750 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 750 ELSE X=JOY
STK(0): IF JOYSTK(1)>10 THEN 700
 ELSE PCLS: FOR I=1 TO 200: NEXT
760 'Hydrogen Bonding
770 IF PEEK(65280)<>126 AND PEEK
(65280)<>254 THEN 770 ELSE PCLS
3: X=47: A=128: B=96: CIRCLE(A,B
),8,4: PAINT(A,B),4,4: CIRCLE(A-
X,B-X),4,4: PAINT(A-X,B-X),4,4:
CIRCLE(A+X,B-X),4,4: PAINT(A+X,B
-X),4,4
780 FOR I=1 TO RND(3): C=RND(0):
 Z=JOYSTK(0): IF JOYSTK(1)<10 TH
EN 810 ELSE CIRCLE(A,B),50,2,1,C
,C: CIRCLE(A,B),50,3,1,C,C: NEXT
: CIRCLE(A-X,B-X),20,2,1,C,C: CI
RCLE(A-X,B-X),20,3,1,C,C
790 FOR I=1 TO RND(3): C=RND(0):
 CIRCLE(A,B),50,2,1,C,C: CIRCLE(
A,B),50,3,1,C,C: NEXT: CIRCLE(A+
X,B-X),20,2,1,C,C: CIRCLE(A+X,B-
X),20,3,1,C,C: GOTO 780
800 'Random Graphics
810 SCREEN1,RND(2)-1
820 F=RND(4): B=RND(8): IF B=F O
R B-4=F THEN 820
830 COLOR F,B: PCLS B: FOR L=0 T
O 3: LINE-(RND(255),RND(191)),PS
ET: CIRCLE(RND(255),RND(191)),RN
D(100): NEXT: FOR P=0 TO 6: PAIN
T(RND(255),RND(191)),RND(4),F: N
EXT P: FOR T=0 TO 800: NEXT T: X
=JOYSTK(0): GOTO 810
```

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Note: Custom joysticks still available.

The Hex Pad Connection

By Theodore P. Hasenstaub

Looking for a quick way to enter Hex code into your CoCo's memory? For a modest investment of approximately $30 and an evening's worth of time, you will be able to do just that. By using this Hex Pad with any Monitor program, or a Basic program that allows you to *POKE* Hex code to memory, you will be able to enter all Hex codes appearing with machine language programs.

The CoCo's main keyboard consists only of a matrix of switches, which are divided into a series of rows and columns. All the inputs and outputs to and from the keyboard are controlled by the PIA chip (MC6821). By scanning these columns, the PIA can instantly detect and decode any inputs from the keyboard. Since the keyboard is attached to the main PC board by means of a 16-pin connector, and the PIA is the only IC controlling it, it is a very simple procedure to attach the necessary connections for a Hex Pad. These connections are made at this 16-pin connector.

I have divided the construction into four parts; Computer Wiring, Cabinet Construction, Keyboard Wiring and Final Assembly. Keep in mind, however, that building this project requires wiring inside of the computer, thus voiding any Radio Shack warranty that may be in effect.

COMPUTER WIRING

Begin by removing the screws holding down the top of the computer. Carefully disconnect the keyboard from the printed board at the keyboard connector. Now remove the keyboard and set it in a safe place. You now have access to the 16-pin connector, to which we will make the necessary connections that are needed.

All the pins are used except for pins 2, 3 and 4. Cut 13 pieces of 30-gauge wire into 15″-long sections. Strip off about 3/16″ on one end, and about 1/16″ on the other. Number each wire from 1 through 16 (don't use #'s 2, 3 and 4). Using the 3/16″ end, begin wire wrapping from the left-most pin on the connector with the wire that you labeled #1. Skip pins, 2, 3 and 4, and continue on with pin 5 through 16. You only have to wrap about 1/8″ onto the connector, any more and you will have trouble when you to to re-install the keyboard. Now, connect these wires to the corresponding pins on the female DB 25 connector (see *Figure 1*).

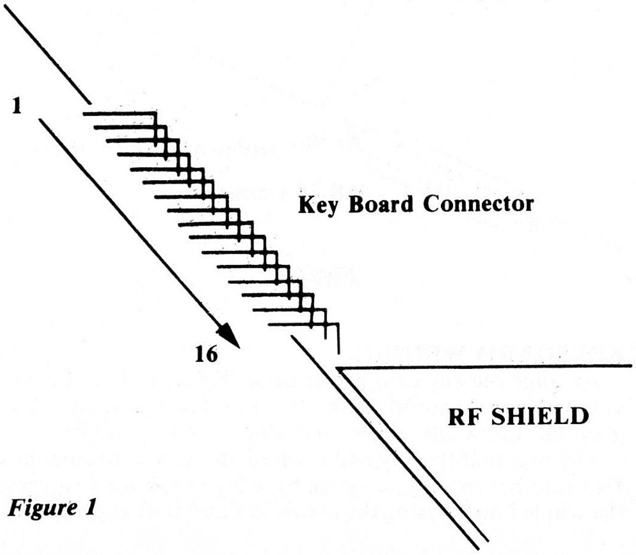

Figure 1

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Next, you must mount this DB 25 connector into the side of the computer case. The connector should be mounted about ½″ to the left of where the main PC board comes in contact with the right side of the computer case. After locating this point, place a mark there. Set the DB 25 connector at this point and make a mark at the other end. Cut out the plastic between these two marks, down to the plastic ledge on the case. Use a small file to adjust the hole in order to fit the DB 25 into place. Make sure that the mounting holes on the DB 25 are set below the top edge of the case, so you will be able to drill holes to hold the connector to the case (see *Figure 2*).

Mark and drill the holes, then mount the connector. Set the top of the case back on. You will now have to file a little bit of the top half in order for the case to fit properly back together over the DB 25 connector. Clean out any plastic that has accumulated inside the computer case, then reinstall the keyboard. Reattach the top half of the case. The computer wiring is now complete.

CABINET CONSTRUCTION

The cabinet I used was the Radio Shack Slope Front Cabinet #270-246. Its color matches the CoCo pretty closely, and the size fits the Hex Pad perfectly. The dimensions for the cut-out, mounting holes and brackets are shown in *Figure 3*.

After you have prepared the cabinet, you can now wire the male DB 25 connector. The cable that I used was a one-foot piece of telephone cable that had about 20, or so, conductors. I removed all but 13 of them in order to give the cable a little flexibility. You should label the wires the way you did for the computer. Now, connect these wires to the DB 25 connector as you did for the other one. When you are finished with this, install the hood on the connector and insert the other end through the grommet in the base of the cabinet (the length of the cable is up to you).

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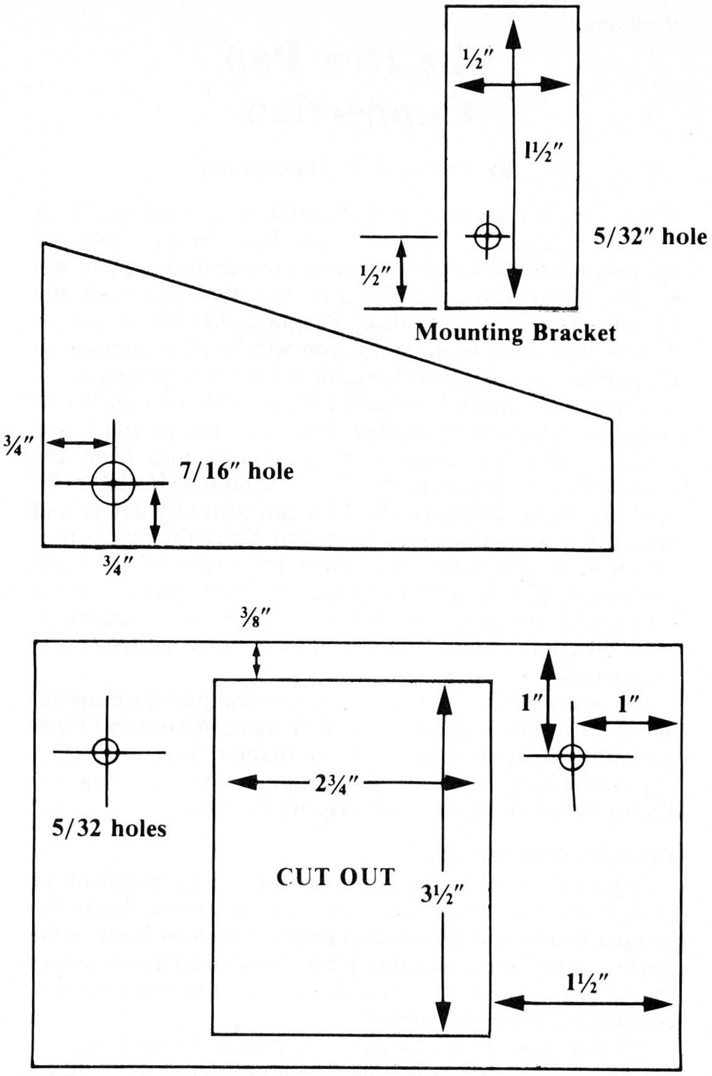

Figure 2

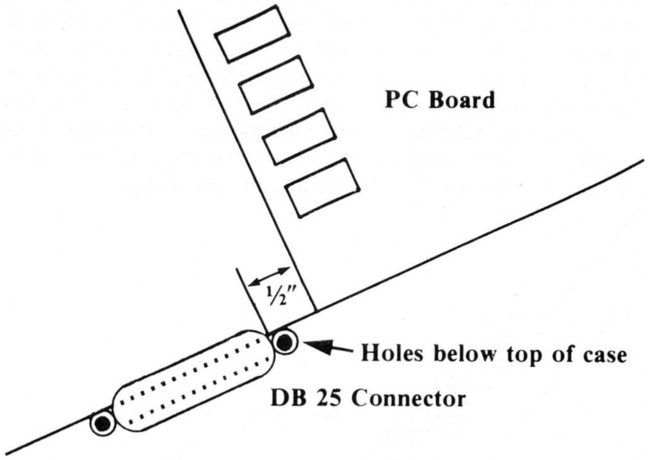

Figure 3

KEYBOARD WIRING

Arrange the key caps as shown in *Figure 4*. The only key you will have to modify is the "H" key. I just painted it dark grey, cut out a left arrow, and glued it on to the key.

The way that the key pad is wired allows you to enter any Hex number, back up a space by using the arrow key, erase the whole line by using the arrow key and shift key together,

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and enter a Hex number to memory by using the "L" (load) key.

Place the key in front of you so that the "A" key is located in the top right-hand corner. Key pad pin designations and wiring are shown in *Figure 5* .

FINAL ASSEMBLY

Mount the key pad into the cabinet top, and secure it using the mounting brackets. I used one-inch long round head 6-32 bolts and three 10-24 nuts as spacers (see *Figure 6*). All that remains to be done is to wire the 13 conductor cables to the key pad as follows:

DB 25 PIN	KEY PAD PIN
1	8
5	25
6	16
7	14
8	33
9	34
10	7
11	5
12	3
13	1
14	9
15	17
16	15

Check all wire connections and assemble the cabinet. You now have your own Hex Pad Encoder. Your CoCo will be happy.

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#UK2 COLOR KRUNCHER — $9.95
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- *Speeds Program Execution Time*
- *Type In A Program From A Magazine, As Is, Debug It, Then Let Kruncher Make It Shorter And Faster*
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Radio Shack
1—MALE DB 25 CONNECTOR WITH HOOD
1—FEMALE DB 25 CONNECTOR
1—13 CONDUCTOR CABLE
30 GUAGE WIRE
MISC. NUTS & BOLTS

A	B	C	D
7	8	9	E
3	4	5	F
1	2	3	←
0		SHIFT	L

Figure 4

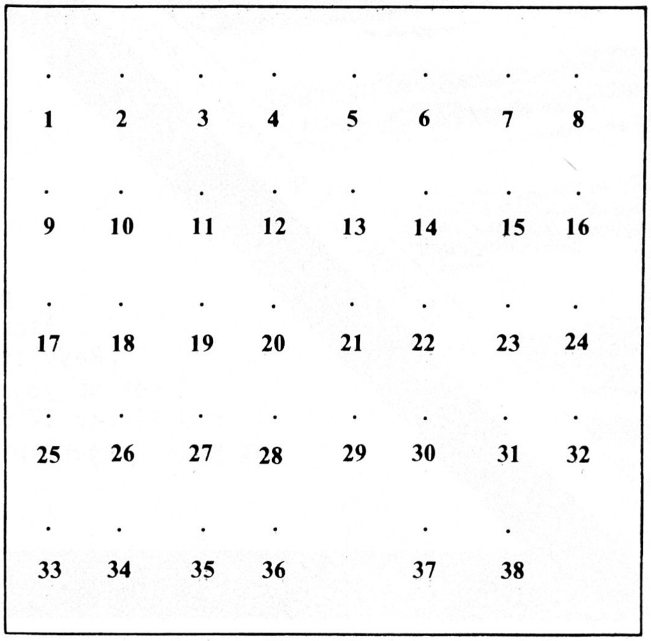


Figure 5

Wire the key board as follows:
Wire PIN #8 to 6 to 4 to 2 to 10 to 18
PIN #7 to 31 to 11
PIN #5 to 29
PIN #3 to 27
PIN #1 to 23
PIN #9 to 26 to 21
PIN #28 to 30 to 32 to 24 to 16 to 38 to 22 to 20
PIN #17 to 19
PIN #12 to 14
PIN #13 to 34 to 37
PIN #15 to 36
PIN #33 to 35

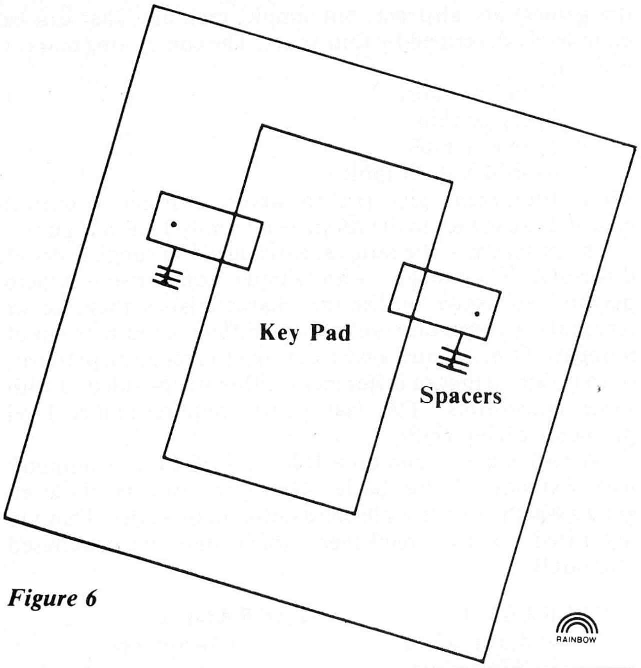


Figure 6

Hardware Review...

Stand, Tape Holder Good Post-Holiday Buys

So, you got a whole bunch of CoCo software for Christmas and now the question comes as to where in the world are you going to *keep* all of this stuff.

One answer can certainly be a 96-cassette holder that lets you keep eveything together and protects it from dust as well.

This cassette holder features six drawers and a case in wood-grain plastic that will take even some of the more dedicated CoCo-ists among us some time to fill up. The drawers are on slides which move easily through grooves and have space to accomodate tapes in their cases. This is an added bit of insurance against dust. The unit is sturdy and has a flat top, another surface that can be used to store materials.

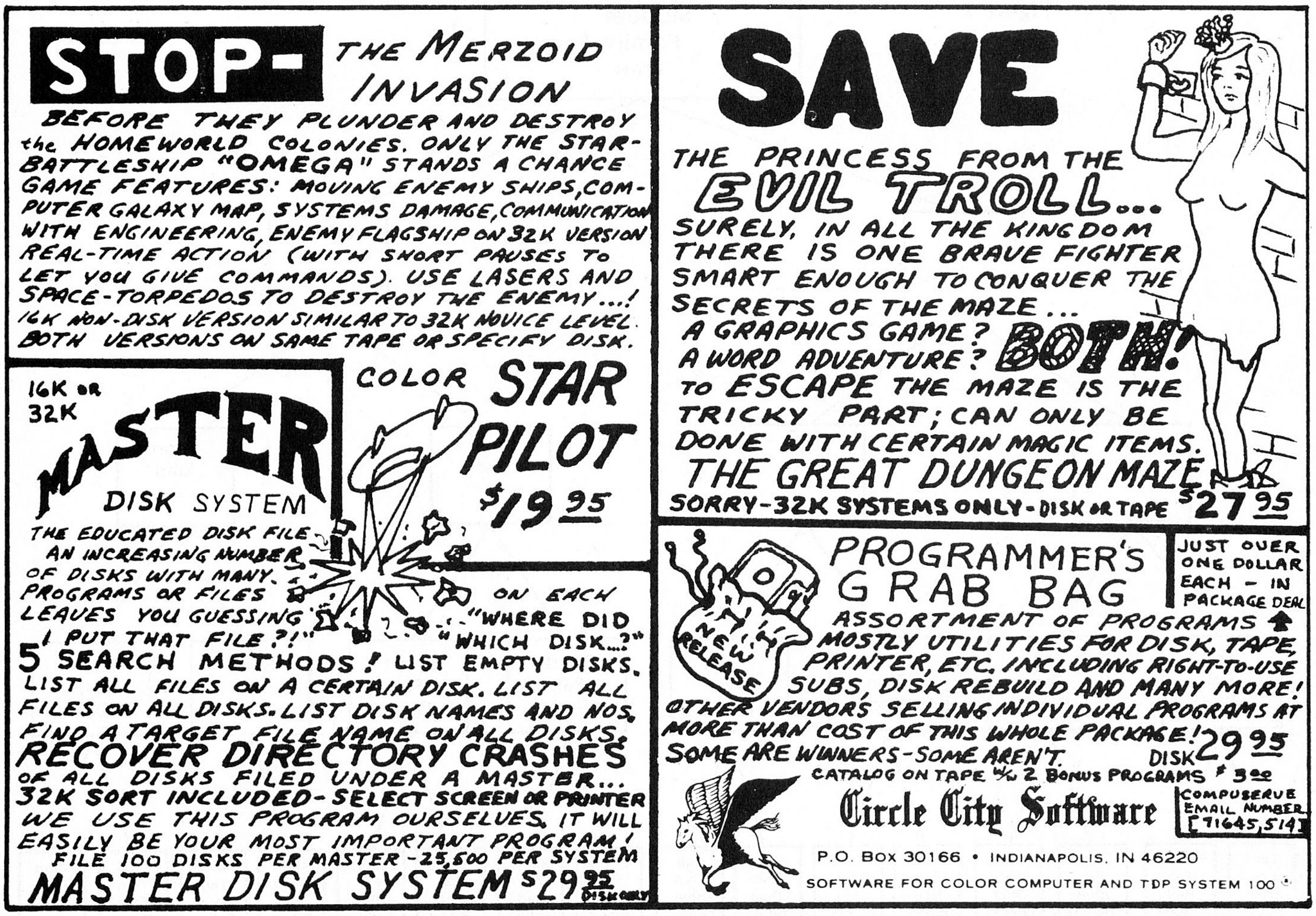
If you have a new printer, you might wish to consider a printer stand. The stand comes with and without a shelf and is in attractive but sturdy clear plastic.

We like printer stands. The main reason is that they let you place paper beneath the printer—eliminating the possibility of jams from between the paper which is feeding in and the paper which is feeding out. They also save space, since the paper supply can remain underneath the printer, rather than in back of it or on the floor.

The addition of a shelf means you could store two kinds of paper beneath the stand—and just thread the type you want to use through it as necessary.

This is a good product and is built to be used with most of the popular 80-column printers.

(Spectrum Projects, 93-15 86th Drive, Woodhaven, NY 11421, Cassette Case $39.95 96 tapes ($22.95 for 48 tape version); stand with shelf $49.95 plus $2 s/h)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MOPTOWN: Logical Structures From Abstract Ideas

By Don Inman
***Rainbow* Contributing Editor**

Very seldom do I find "educational" computer software worth writing about. The educational value of most programs that claim that distinction is questionable. I recently had an opportunity to play-test a series of programs called *Moptown* developed by the Learning Company of Alpine, California, and marketed by the Follett Library Book Company. These programs definitely contain educational qualities. Because the programs provide a wide range of ability levels, I recommend them for children of all ages.

Although primarily designed for children's use, adults will find the higher level games quite challenging. I highly agree with this quote from the manual that accompanies *Moptown*. "*Moptown* games provide a friendly environment where children, using moppets as concrete examples, learn to build logical structures using abstract ideas."

The *Moptown* programs are a series of learning games based on the participant's ability to recognize sameness and difference, concepts that are basic to logical thinking. From early childhood, we are constantly confronted with experiences involving the comparison of objects. We attach descriptive words such as *big* or *little, fat* or *thin, rough* or *smooth* to differentiate between objects that we encounter. The Moppets who reside in Moptown (the fantasy locale of the games) are abstract, but simple, creatures that can be completely described by four traits. The contrasting pairs of traits are:

1) tall or short
2) fat or thin
3) red or blue
4) Bibbit or Gribbit

These four traits give rise to sixteen distinct *Moptown* creatures as shown in the *Moptown* Family Tree in Figure 1.

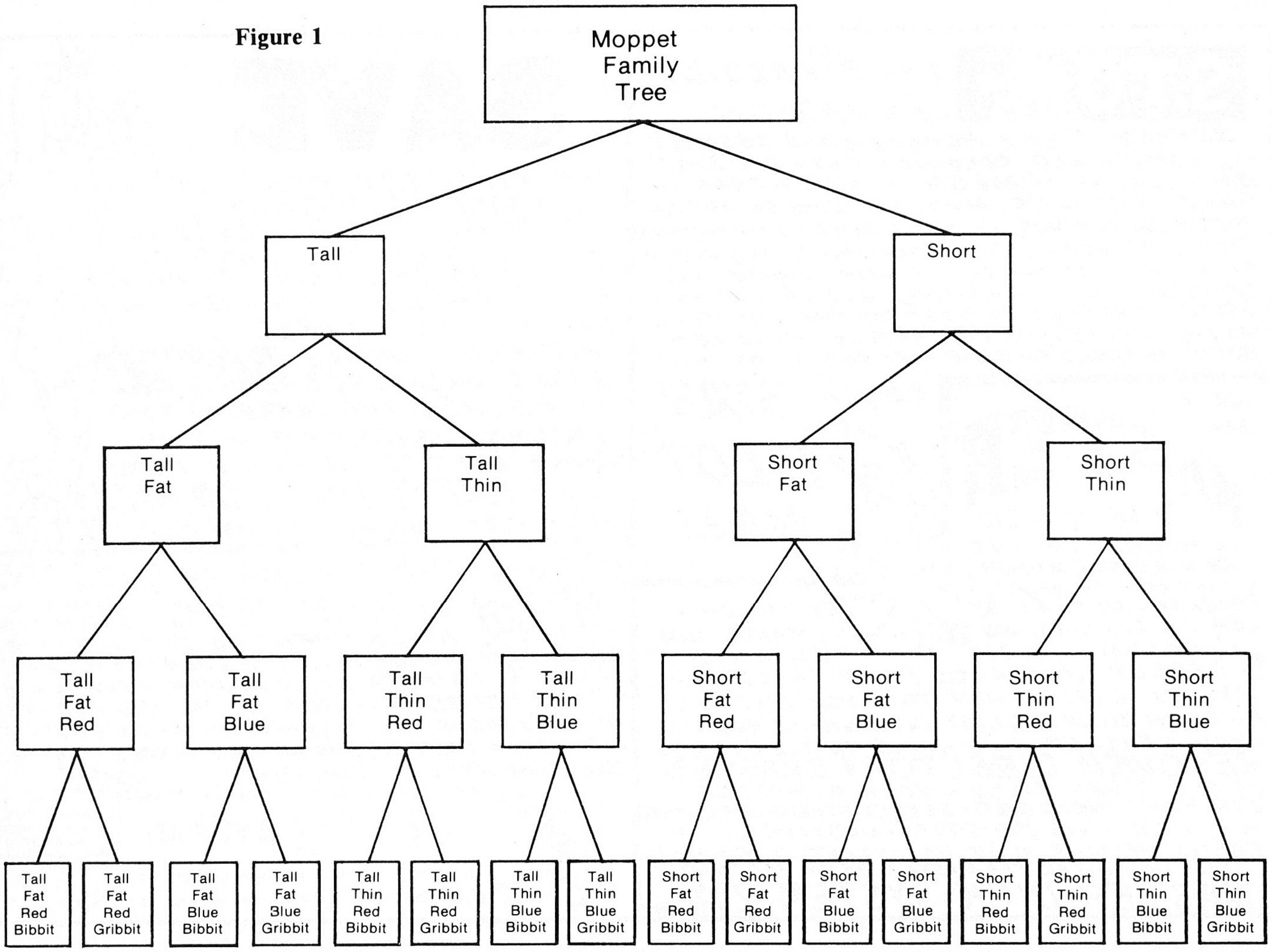
The program in the series are arranged in a rough order of difficulty. They begin with simple comparisons where players are asked to list the characteristics they see or recognize a common similarity or difference in a group of moppets. Other games aid in learning to recognize patterns, or to create strings of differences, either open-ended or with some constraints. The last games require higher level problem-solving skills.

Moptown games run on a 16K TRS-80 Color Computer with Extended Color Basic. *Moptown* consists of eleven games which are available on cassettes or diskettes. They are organized in two packages which may be purchased separately.

PACKAGE 1
1) Make My Twin
2) Who's Different
3) What's the Same
4) Who Comes Next
5) Moptown Parade
6) Who's Next Door
7) Change Me
8) Clubhouse

PACKAGE 2
1) Secret Pal
2) Moptown Map
3) Moptown Hotel

Figure 1



Moppet Family Tree
Tall
Short
Tall Fat
Tall Thin
Short Fat
Short Thin
Tall Fat Red
Tall Fat Blue
Tall Thin Red
Tall Thin Blue
Short Fat Red
Short Fat Blue
Short Thin Red
Short Thin Blue
Tall Fat Red Bibbit
Tall Fat Red Gribbit
Tall Fat Blue Bibbit
Tall Fat Blue Gribbit
Tall Thin Red Bibbit
Tall Thin Red Gribbit
Tall Thin Blue Bibbit
Tall Thin Blue Gribbit
Short Fat Red Bibbit
Short Fat Red Gribbit
Short Fat Blue Bibbit
Short Fat Blue Gribbit
Short Thin Red Bibbit
Short Thin Red Gribbit
Short Thin Blue Bibbit
Short Thin Blue Gribbit

Note: these are the programs that have received such national Acclaim!!

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MPP-TUTORIAL — Programming tool of the professionals — "lets you EASILY create superior graphics without using the tèdious DRAW, PAINT, LINE, PSET, CIRCLE, etc. commands. I have seen the results, and they are INCREDIBLE — If you want to see and use the full graphic potential of your CoCo, this program is — REQUIRED!" Quote Chromasette. **$34.95T or D★**

EL CASINO — Three STARTLING action packed hi-res graphic games that have received RAVE reviews. All programmed with MPP. Each game is over 14K long.
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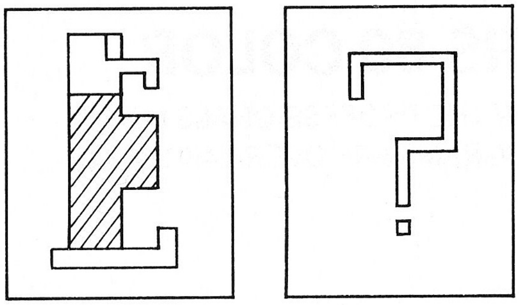
Although the games are related, each one stands alone. Complete instructions are included in each program. You may look at the instructions at the beginning of each game, or you may go back to the instructions by pressing the question mark (?) key after the game has started.

Although it's impossible to provide complete descriptions of all eleven games, I'll give you a quick peek at what to expect from a few of the programs.

Make My Twin
This is one of the easiest. The computer draws a moppet inside a rectangular block.



You are then requested to make its twin in the empty box. You do this by selecting one trait at a time from the following menu of traits.

1) TALL or SHORT (T or S)?
2) FAT or THIN (F or T)?
3) RED or BLUE (R or B)?
4) BIBBIT or GRIBBIT (B or G)?

As the selections are made, the computer draws your moppet in the empty box. After all four traits have been described, the creation of your moppet is complete and the computer gives a message of: YOU WIN—if correct; or THAT'S NOT MY TWIN. PRESS ENTER AND TRY AGAIN—if incorrect. After the correct answer has been given, you have a choice of playing again with a new moppet or ending the game.

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This program can be played by the very young. All it requires is recognizing the correct traits and making single key responses to the computer's questions.

Who's Different
Four moppets are drawn in a row on the screen. You may choose to have this done in one of two ways:

1) three moppets the same
2) no moppets the same

If you choose the first option, you are then challenged to pick out the moppet that is different and to tell why it is different. If you choose the second option, you must tell which one is the most different from the others, and why.

Who Comes Next
Six moppets are arranged in a row according to one of these three patterns:

1) ABABAB
2) ABBABB
3) AABAAB

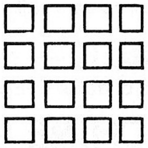
Of course, you must observe the traits that make a moppet an A or a B. The computer draws only the first five. You must choose the four traits of the moppet that comes next such as:

A B A B A ?
or
A B B A B ?
or
A A B A A ?

This is not as easy as it first appears. It is easy when looking at A's and B's, but not so easy when viewing Bibbits and Gribbits.

Secret Pal
If you have played the game of *Mastermind*, you will find this one just as enjoyable. You are asked to create a moppet that matches the program's unseen Secret Pal. When your moppet has been created trait-by-trait, the computer shows how many traits you guessed correctly. However, it does not tell you which guesses are correct (only the number of correct guesses). The computer then allows you to repeat the process until you have correctly created a match for the Secret Pal.

***Moptown* Map**
This is one of the more complex games. A four-by-four matrix of houses is drawn.



You are asked to place a moppet in each house according to neighborhood rules. Each row and each column has two rules for its residents. The rules are selected from the four moppet traits. Five houses are filled in by the computer to provide clues. You must fill in the rest by moving the cursor to an empty house and creating a moppet with the proper traits conforming to both column and row rules. If your moppet doesn't fit, an X appears. You can then try another moppet at that house or move the cursor to a different house.

This game is quite challanging and will be enjoyed by adults as well as children.

These descriptions are necessarily short and incomplete, but they may give you some idea of the flavor or the

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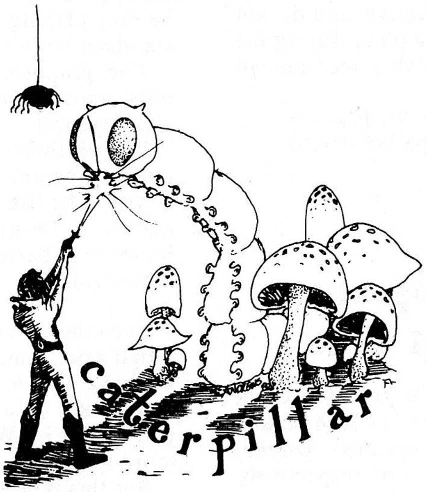

CATERPILLAR

O.K., the Caterpillar does look a lot like a Centipede. We have spiders, falling fleas, monsters traipsing across the screen, poison mushrooms, and a lot of other familiar stuff. COLOR 80 requires 16k and Joysticks. This is Edson's best game to date. $19.95 for TRS 80 COLOR.

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TUBE FRENZY

(by Dave Edson)

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(by Dave Edson)

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TINY COMPILER is written in BASIC. It generates native, relocatable 6502 or 6809 code. It comes with a 20-page manual and can be modified or augmented by the user. $24.95 on tape or disk for OSI, TRS-80 Color, or VIC.

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Moptown games. As you can see, I have not given away the plot in all eleven games. Although these games may seem to be on the expensive side, they have much more value than typical game software. The educational features of the games have been very carefully planned, offering challenges for a wide range of age levels.

The simple graphics used are quite effective, and do not detract from the thought processes taking place during the game. If you have young children, I highly recommend *Moptown* for your computer library.

(Follett Library Book Company,4506 N.W. Highway, Crystle Lake, IL 60014; Package 1, $40 tape, $45 diskette; Package 2, $30 tape, $35 diskette.)

Software Review...

Two "Donkey" Programs Feature Many Great Times

The hottest new game in the CoCo world are the "Donkey" games—patterned after the *Donkey Kong* that is famous in the arcades. The two programs—*Dunkey Munkey* and *Donkey King* are available from, respectively, Intellectronics and Tom Mix Software.

Both of these games feature a gorilla, a girl yelling for help and a workman-like character affectionately named Mario. Mario must get from one part of the screen to the other, dodging fire, barrels and other assorted goodies thrown from above by the gorilla. Once he has, he is in a position to rescue the girl.

Both programs run in 32K, offer sound, music and good graphics. Both are in machine code, so are extremely fast.

Tom Mix Software

Donkey King may be the most ambitious arcade game to come out for the Color Computer to date. It is so true to the arcade version that there is, for all practical purposes, no difference between the two. (Maybe Mix should supply a cardboard box into which you could place your quarter before playing.) Indeed, *Donkey King* creates a new standard from which to judge games of this sort.

The graphics are absolutely top notch. The sound is outstanding. And the play of the game is true to the arcade in every respect.

It is all there—four full screens (barrels, rivets, elevators and conveyors). The gorilla actually hurls the barrels down at you. The fire changes color when you jump to pick up a mallet. Little numbers appear on the screen when Mario jumps over barrels and you can get a bonus for completing a screen quickly.

Even the method for placing your name on the scoreboard is first rate. And, frankly, scoring is about the only objection we have to *Donkey King*. The game comes with a predefined set of scores which reassert themselves every time you load it in. We wish there were a way to save *your own* score to tape as well.

But this is certainly a most minor point to a game which has it all. Indeed, *Donkey King* is the king of the donkey games and a fantastic rendition of a popular arcade offering.

Intellectronics

Dunkey Munkey, against almost any other competition, would be a top-choice offering. While it does not have the finer points—nor as many screens—as does *Donkey King*, it is a fine game that will provide a great deal of play and enjoyment. In fact, the fact that it is somewhat more simple to play may make it more suitable for younger children who might be frustrated by the more challenging and complex version of this arcade classic.

Mario has two screens to play with in *Dunkey Monkey—pop rivets and elevators. The elevators are not as complex as in Donkey King*, but the scores build higher and faster. Too, Mario moves faster in *Dunkey Munkey*, a sometimes enjoyable variation that allows you to get where you are going a little more quickly.

The only real objection we have to *Dunkey Munkey* is the music. It seems that the author has written in a few bars too many between screens. After all, you *do* want to get with the action—not listen to music in an arcade game. The music is not so long as to be objectionable, but it is a bit annoying when you have joystick in hand and are all primed and ready to go.

We believe both games to be good. That *Donkey King* is such an outstanding rendition should not preclude a fine piece of work on *Dunkey Munkey*. The latter merely suffers somewhat by comparison.

(Dunkey Munkey, Intellectronics, 22 Churchill Lane, Smithtown, NY 11787, $24.95)
(Donkey King, Tom Mix Software, 3424 College NE, Grand Rapids, MI 49505, $24.95 tape, $29.95 disk plus $1 p/h)

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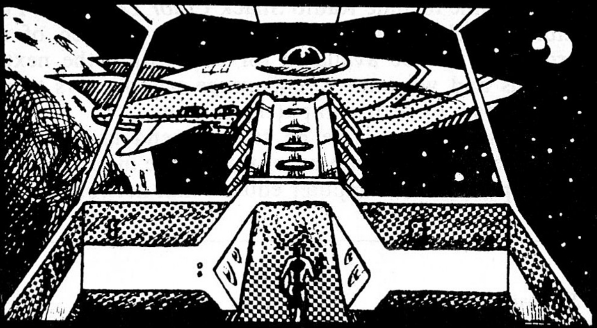
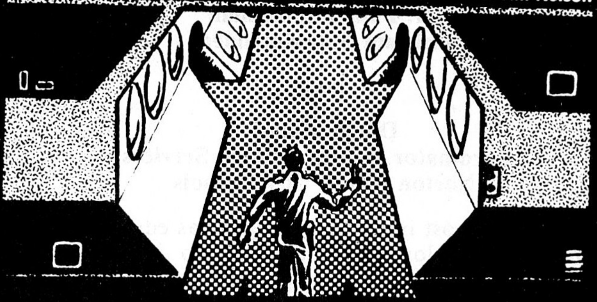


Written by Kevin Herrboldt & Tim Nelson



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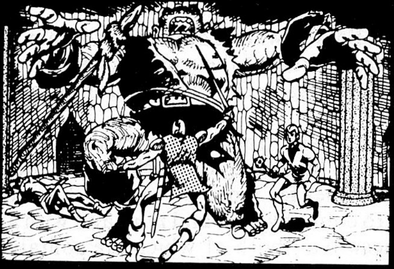
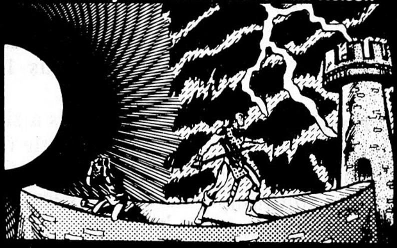
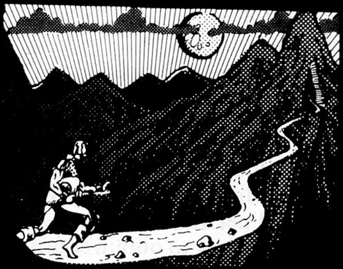
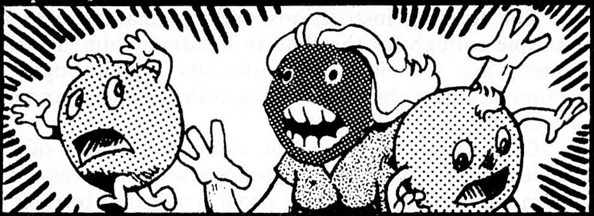


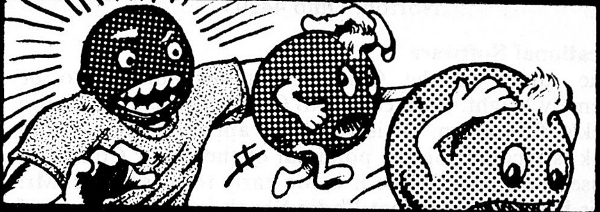
Written by Kevin Herrboldt & Tim Nelson



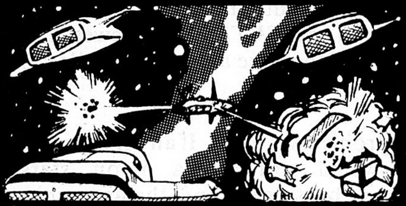


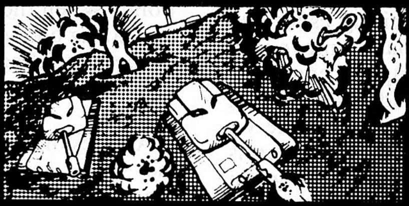
ADVENTURE TRILOGY A Trilogy of quests *featuring 3-D high-res graphics in machine code.* First comes ritual combat on the **WORLD UNDER THE CIMEEON MOON**, to test your worthiness as a warrior. Once proven, you will be teleported to **DAZMAR'S UNDERWORLD OF DOOM** to search for the Eye of Dazmar. The **FORSAKEN GULCH** is the final arena, where a wicked idol awaits restoration.

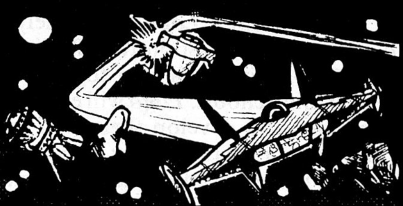




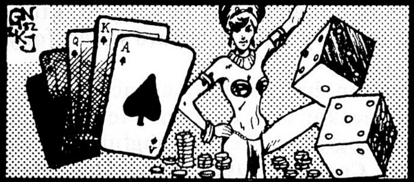
THE NIBBLER & MS. NIBBLER A fast maze chase game featuring the nibbler man and three bumbling preditors. *Written in machine code and joystick compatible,* this fun packed game is enjoyed by all. **MS. NIBBLER** is similar to THE NIBBLER described above but features a different maze and MS. NIBBLER for the ladies.







COMBAT GAMEPACK 3 action packed games featuring lifelike graphics and sound. ***EXTENDED** BASIC required* **2-1-0 TANK COMBAT** pits two players against each other in 5 different terrains. **STELLAR BATTLE** lets you pilot a flexwing fighter through deep space fighting dorian squadrons. **GALACTIC** BLOCKADE is a favorite two-player arcade game of speed and skill.



VEGAS GAMEPACK The thrills of a Las Vegas casino at home! ***Extended BASIC required.*** **CASINO CRAPS, 21, ONE ARMED BANDIT, UP AND DOWN THE RIVER, & KENO.** A bank tracks players winnings from game to game.

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Education...

Education and The Color Computer

By

Dr. Paul Kimmelman
Assistant Superintendent

and

David Macali
Coordinator of Instructional Services
Norton (Ohio) City Schools

Perhaps the most important thing we as educators who are using the Color Computer can do is establish a sophisticated network. We are proposing in this month's column that all educational Color Computer users send us the following information:

A. Computer coordinator's name
B. School district
C. Address
D. Educational uses of Color Computer
E. Software being used and evaluations of it

We are suggesting that you mail this information to us and we will then compile it for future publication in *the Rainbow*. Hopefully, this will develop a comprehensive, educational network of Color Computer users. In addition, this will enable us to obtain educational reviews of software.

Dr. Paul Kimmelman, Assistant Superintendent
Norton City Schools
4128 S. Cleveland-Massillon Road
Norton, Ohio 44203

Educational Software

The future of the Color Computer appears to be extremely bright. I talked to Bill Gattis, Director of Radio Shack's Education Division. It is apparent that Radio Shack is recognizing the potential of the Color Computer for use in schools. While it is too early to be specific, Mr. Gattis has assured us that Radio Shack is in the process of preparing a variety of its educational material for Color Computer use.

On another Radio Shack note, our preliminary review of *Color Pilot* and *Color Logo* is extremely exciting, especially *Logo*. There is no question that Radio Shack's move into offering *Color Logo* is a step toward using the computer properly in our schools. *Logo* will enable students to control the computer and develop their own programs. While we have only taken a preliminary look, what we have seen is excellent. Further, Radio Shack currently offers Logo in 32K disk, but a ROM Pack will be available within the next few months.

Another note of praise needs to be directed toward Follett Library Publishing Company. Currently, Follett is preparing *Bumble Games* and *Moptown* for 16K cassette computer use. Our preliminary reviews of these two programs are also excellent. *Moptown* will become an extremely popular program for elementary school use. What is especially interesting about *Moptown* is that it requires logical thinking and motivates children to identify patterns, strategies and differences between objects.

It is becoming apparent that the Color Computer will be a successful component for educational use. Not only Radio Shack and Follett, but a variety of other software producers are producing materials that are appropriate for student utilization and require some innovative or logical thinking.

In the next few issues of *the Rainbow*, we hope to begin providing the educational users of the Color Computer some reviews of what we consider to be the better software programs. Our school district's highest priorities at the present time include Radio Shack *Color Logo*, and Follett Library Publishing Company *Moptown*. Each of these programs will be available for sale within the next few months and we want to encourage school users to make them a part of their computer program.

In conclusion, please be sure to send us the material requested at the beginning of this article in order for us to develop a Color Computer educational network.

Software Review...

Money Is a Cute, Cents-able Program for Children

Money is the first B5 Software Company program I have reviewed, and the fact is that if their other offerings are as good as this little program for children, I'm mightily impressed.

Money is a simple, straightforward educational program for those little folk just beginning to reach out for practical applications of their meager store of worldly knowledge. They have learned to count by *fives* and *tens*, and with a little help and added incentive - both of which are contained in this program - they will be able to make the leap from digital abstraction to concrete achievement of the most practical order.

The loading instructions and commands seem almost simple enough for the child to handle by him/herself. And there are five levels of difficulty which ought to be conquerable if the child begins at the first level and masters each one before moving on.

Once the level is chosen, circular symbols of various colors appear on the screen to represent the coins. Coins are arranged in an ascending order according to their value. Each row of coins is labeled with that coin's numeric equivalent, including a cent sign. In the upper-right corner of the screen is an answer box with a permanent decimal point. When the child computes the total value of the coins appearing on the screen and *ENTERs* the answer, it appears in the box - if correct. Otherwise a beep is sounded and the child must try again.

A series of three problems is given. If all three problems in the series are answered correctly, a moon, stars and spaceship appear on the screen, and the spaceship rises across the screen to land on the moon. If one or more of the problems are missed, the spaceship begins an ascent, but crashes. The program then returns to the menu where the same or new level of difficulty may be selected. I think the spaceship routine is a very creative reward system for young learners.

The documentation brochure which accompanies the tape is very well done, and even contains a few teaching tips to help make the program more meaningful and helpful.

(B5 Software Company, 1024 Bainbridge Place, Columbus, OH 43228, 16K Ext. Basic, $19.95)

—Courtney Noe

COLOR COMPUTER

NEW!

MACRO-80C

The Micro Works is pleased to announce the release of its **disk-based editor, macro assembler and monitor,** written for Color Computer by Andy Phelps. THIS IS IT — The ultimate programming tool!

The powerful 2-pass macro assembler features conditional assembly, local labels, include files and cross referenced symbol tables. MACRO-80C supports the complete Motorola 6809 instruction set in standard source format. There are no changes, constraints or shortcuts in the source language definition. Incorporating all of the features of our Rompack-based assembler (SDS80C), MACRO-80C contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility.

The screen-oriented text editor is designed for efficient and easy editing of assembly language programs. The "Help Key" feature makes it simple and fun to learn to use the editor. As the editor requires no line numbers, you can use the arrow keys to position the cursor anywhere in the file. MACRO-80C allows global changes and moving/copying blocks of text. You can edit lines of assembly source which are longer than 32 characters.

DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

The editor, assembler and monitor — as well as sample programs — come on one Radio Shack compatible disk. Extensive documentation included. MACRO-80C **Price: $99.95**

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Forth is a highly interactive language like Basic, with structure like Pascal and execution speed close to that of Assembly Language. The Micro Works Color Forth is a Rompack containing everything you need to run Forth on your Color Computer.

Color Forth consists of the standard FORTH Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. Color Forth also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. Color Forth contains 10K of ROM, leaving *your* RAM for *your* programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound. The 112-page manual includes a glossary of the system-specific words, a full standard FIG glossary and complete source listing. COLOR FORTH ... THE BEST! From the leader in Forth, Talbot Microsystems. **Price: $109.95**

SOFTWARE DEVELOPMENT SYSTEM

The Micro Works Software Development System (SDS80C) is a complete 6809 editor, assembler and monitor package contained in one Color Computer program pack! Vastly superior to RAM-based assemblers/editors, the SDS80C is non-volatile, meaning that if your application program bombs, it can't destroy your editor/assembler. Plus it leaves almost all of 16K or 32K RAM free for **your** program. Since all three programs, editor, assembler and monitor are co-resident, we eliminate tedious program loading when going back and forth from editing to assembly and debugging!

The powerful screen-oriented Editor features finds, changes, moves, copys and much more. All keys have convenient auto repeat (typamatic), and since no line numbers are required, the full width of the screen may be used to generate well commented code.

The Assembler features **all** of the following: complete 6809 instruction set; conditional assembly; local labels; assembly to cassette tape or to memory; listing to screen or printer; and mnemonic error codes instead of numbers.

The versatile monitor is tailored for debugging programs generated by the Assembler and Editor. It features examine/change of memory or registers, cassette load and save, breakpoints and more. **SDS80C Price: $89.95**

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PARALLEL PRINTER INTERFACE — Serial to parallel converter allows use of all standard parallel printers. PI80C plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. **PI80C Price: $69.95**

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Berserk — Have fun zapping robots with this Hi-Res game by Mark Data Products. Cassette requires 16K. **Price: $24.95**
Adventure — *Black Sanctum* and *Calixto Island* by Mark Data Products. Each cassette requires 16K. **Price: $19.95** each.
Cave Hunter — Experience vivid colors, bizarre sounds and errie creatures in hot pursuit as you wind your way through a cave maze in search of gold treasures. This exciting Hi-Res game by Mark Data Products requires 16K for cassette version. **Price: $24.95**

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PRINT #-2,

(Continued From Page 8)

program and system used to help everyone and we hope that you will make use of it. As we say, there is no charge for doing so whatsoever. This applies not just to clubs and user groups, but to *any* publication that wishes to make use of this system.

You will read elsewhere in this edition about *RAINBOWfest*, but let me make note now that it is scheduled for April 22-24 at the Hyatt Regency Woodfield, just outside of Chicago. The hotel is easily accessable by highway and close by O'Hare International Airport. In addition, Woodfield, the world's largest enclosed shopping mall, will offer an attraction for those who don't want to spend the whole time at the show. Too, there are special rates at the hotel available for *RAINBOWfest* participants and, based on preliminary information, it looks like we will have a good turnout of exhibitors. So, mark your calendars now.

By the by, we have some new members of the staff that I would like to introduce.

Jim Reed, our new managing editor, comes to us with a long and distinguished record as a writer, editor and professional photographer. Jim has held major writing and editing responsibilities with the Commonwealth of Kentucky and was press secretary to the mayor of Louisville. He was also one of the staff members of *Louisville* Magazine and has recently been editor of the news bureau at the University of Louisville. Like many of us, Jim was "bitten" by the CoCo bug about a year ago and is the proud owner of one of the first TDP-100's to be sold. You've seen his byline in *the Rainbow* for several months now and we are pleased and proud that he is joining us.

Sally Nichols has joined us as our new art director. She is a graduate of the University of Louisville's program in fine arts and has done quite a bit of commercial work in the area. She was one of only a few students chosen to work in University Graphics as a student designer and she is the person who designed the new format for *the Rainbow*. Most of the things which we will be putting into effect to make your magazine more attractive to read will come from Sally's ideas.

Anne Yeiser has also joined us as production coordinator. Anne has become a major influence in getting *the Rainbow* out to you on time and in its present form.

No, we have not made our right-hand helper, Pat Hirsch, go it alone while we increased the editorial side staff. Pat, frankly, can do most anything, but the volume of what she was able to do has been overwhelming. So, if a woman with a lilting Australian accent answers the telephone, say "hello" to Ivanka Kleier, our customer service manager. Ivanka is one of those "let's do it right" people—so you can be sure that any needs you have, whether addressed by letter or phone call, will be in good hands.

If, on the other hand, the phone is answered by someone *without* an Australian accent, then it is probably Monica Wheat, our research assistant and customer service rep. Monica is in charge of keeping track of everything—a mammoth job.

Alice Showalter, our new bookkeeper, will keep things straight, moneywise. Alice has a wealth of experience and you can be sure that she can help you with a smile.

I guess we should also mention the other person whose name appears on our masthead, Wendy Falk. She's in charge of transportation. That's what happens when you need a job and have just turned 16.

As we hope you know, we constantly seek to improve *the Rainbow*. **Your** input is the primary voice to which we listen. In response to your requests, we began Joe Kolar's *Basic Training* last month, a column for pure beginners. It contains a wealth of beginner hints, tips and suggestions. This month we take that a step further with the addition of the redoubtable Dick White to our staff. His new column, *Bits and Bytes of Basic*, is also aimed at the beginner—but from a different area. Dick will be writing about optimizing Basic programming and what he has to say will, we believe, be of interest to most of you.

Also note Tony DiStefano's new hardware series begins this month. We will be carrying Tony's projects and supplementing them with contributions from several others, such as Ted Hasenstaub this month. Some of these other people, such as Ted, will become semi-regular contributors.

To be honest, all this expansion is possible only because we are able to increase the number of pages in each issue. You will, I suppose, notice that once again *the Rainbow* has more pages than ever before (I almost said fatter, but it isn't—simply because the new pages are thinner and have less bulk).

This increase in space is possible only because of advertising. I do want to thank each of you for the help you have given us this past year and for being so kind as to mention us when you buy software, hardware and other products. Please continue to do so. It helps us a great deal and, at the same time, makes it possible for us to continue to increase the size and scope of *your* magazine.

And, you know, all of us here—from me (who, somehow, managed to start this whole thing 18 months ago) to Jim

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Reed and Monica Wheat, our newest employees—*really* do consider *the Rainbow* to be **your** magazine. I like to think of the CoCo world as one big community and that we're just the means to tie it together. I think we have an affection for CoCo here and I know I view *the Rainbow* as something a little more than just a commercial enterprise.

We started small and grew with CoCo. And, yes, I like to think many of you grew—and will grow—with us. So, if you don't mind my waxing poetic as I close, I'd like to wish you all a happy 1983 and paraphrase something I read one time: *"Grow Along With Me, The Best Is Yet To Be!"*

—Lonnie Falk

Software Review...

If Pinball's Your Game *Nova's* the Name

Pinball, the premier coin-operated game machine. I can remember not having a single TV set in my hometown. I can remember having to ride 25 miles with my parents to go to a movie, mainly because it had that new marvel—air conditioning. I can remember penny postcards and our old outhouse, too. But, I can't remember life without pinball.

Now, with *Nova-Pinball*, we have that old favorite in its latest form video pinball. Wat is it about pinball? I mean right from the earliest machines, we've never had much control over the ball. Aside from working a couple of flippers and lifting and shaking the machine a little, it's always been mostly a matter of luck. Yet, we slip a coin in, pull the plunger back, each in our own unique, patented style, and launch the steel ball and ourselves into adventure land. We've all seen the pinball "high," a transfixed human being seems handcuffed to a machine, his eyes glazed over, multi-hued lights flashing in his face, the sound of bells ringing in his ears, and every now and then what appears to be involuntary muscle spasms as he attempts to exert a little more control over his fate. With the skill that comes only from practice, the pinball addict can make his flight of fantasy last sometimes for hours.

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RAINBOW CERTIFICATION SEAL

For some people, the very *raison d'etre* was to play pinball, but even those of us who weren't totally addicted usually had our favorite machine. Mine was Lady Luck and it had an attractive drawing of a very healthy-looking blonde who must have been a cousin of the RC Cola calendar girl. She had a come hither look that always got to me. People do become emotionally involved with machines, you know.

Just think, now I can carry my favorite pinball game in my shirt pocket, next to my heart. Of course, Lady Luck may have a few wrinkles now, but I couldn't help thinking of her while watching *the Rainbow* editor clutching his trusty CoCo by the sides, totally immersed in *Nova-Pinball.* His fingers were on the "down-arrow" and "clear" keys (*Nova's* flipper buttons) and his arms were stretched out in that classic stance as the bells rung and the lights flickered across his face. A video game library isn't complete without pinball.

Too bad that *Nova-Pinball* doesn't have a "tilt" feature, because Lonnie would have triggered it for sure the way he was "getting into" the game. It does have bumpers and thumpers and ball kickers that racked up all sorts of points which Lonnie readily took credit for, even though I don't think muttering "Ungh," "Acht" and "Be there!" has all that much effect on the video screen—unless you also manage to pull a cord loose.

Nova-Pinball is a cute little game simple enough for an editor to play. It's in machine language and requires 16K.

(Bumblebee Software, P.O. Box 25427, Chicago, IL 60625, $20 on tape.)

Jim Reed

Software Review...

Mega-Bug Magnifies Difficulty, Fun!

Of the several people I've observed playing *Mega-Bug*, most have the same initial reaction: "Hey, this magnifying glass doesn't help; it just makes it harder! This would be a lot easier without the magnifying glass." Very perceptive. And, doubtless true. Pin the Tail on The Donkey would be a lot easier without the blindfold, too, but the prospect of "pinning your tail in the wrong place" is what makes both games fun.

Mega-Bug, a 16K ROMPAC maze game from Radio Shack, is sort of a Mexican second cousin to Pac Man, the way I figure it. There's a cute rendition of "La Cucaracha" at the beginning. That's appropriate when you remember that "cucaracha" is, of course, Spanish for cockroach. I mean, how many other songs about bugs can you name? Anyway, the music has a Spanish harmony about it, too. On the other hand, the bugs speak English, as you will find out the first time they get you, and that'll happen quickly enough. By the way, for a good look at how *Mega-Bug* looks on the screen, refer to last month's *Rainbow*, page 11, for a big color picture.

The idea is simple. Run through the maze, chewing up white dots as you go and leaving green dots—sort of a trail of crumbs—behind you. The bugs—eight of them to start with—meander about until they find your green dots which they find tasty. So, they eat the green dots and, in the process, you, too, if you happen to be loitering around the next corner. If you're alert, you'll see them in plenty of time to outrun them, but here's the catch: Watch out or you'll find yourself being chased into a dead-end that'll live up to its name.

The really unhandy thing about the magnifying glass—which, in case you haven't seen a picture in a Radio Shack flyer or catalog, is moving inset which shows an enlarged view of the section of the maze you happen to be in at the time—is that just when you begin to get cocky, you find a cockroach is hot on your heels and you're trapped like an Orkin man with a clogged spray valve. As they dance the "Revenge on Raid" Rhumba and yell, "We gotcha," you're the one who goes belly up.

With some practice, though, you'll manage to clear a screen of all the white dots without getting bugged. Your reward? What else, a tougher maze, more bugs, and you're the bugbait.

Mega-Bug is easy to learn to play. We found it played well on either the keyboard or the joysticks. At the top of the screen, you can check your elapsed time and, at the bottom, your running score. Your running score will improve as you learn to circle around, double back and otherwise lay false trails of yummy green crumbs.

Mega-Bug is by Steve Bjork and is licensed to Tandy through Datasoft, Inc. Again, Steve has developed an enjoyable, colorful game, and the convenience of the ROMPAC format is unbeatable. Nonetheless, Steve will agree this is one program that will never be bug-free.

(Radio Shack, nationwide, Catalog #26-3076, $34.95)

Jim Reed

Software Review...

Laser Tank Provides A Formidable Challenge

The fact is, Yank, that if you're going to protect the American Eagle from the enemy tanks, and keep their deadly lasers from crisping your bird right down to a greasy wishbone, you'd better start fast-tracking the moment you come on screen.

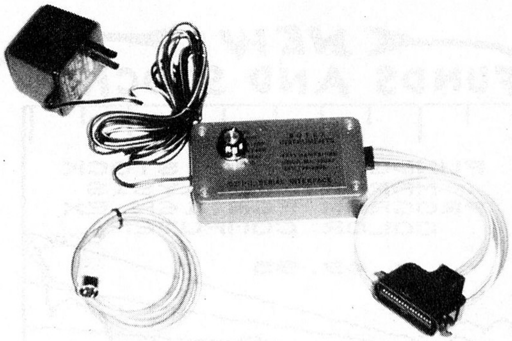
The problem here is that the enemy tanks have advanced, total-computer technology, while you have human decision-making and motor responses integrated into yours. Not to mention slightly delayed joystick responses. Nevertheless, *Laser Tank* is fun.

Though the program's name is similar to *Laser Tank Duel*, the Renaissance Game Designs offering we reviewed in your December issue of *the Rainbow*, the two games are sufficiently different that owning one wouldn't eliminate the other as a possible acquisition.

The object of *Laser Tank* is to defend your symbolic eagle (bottom of screen) from attacking enemy tanks. If in the process of defending the eagle you lose four tanks, or the computer's tanks shrink-wrap your bird with a blast of *mega*-light, you lose.

Both warring factions must wander a maze of corridors in their attempt to attack and destroy, but can pierce the walls with their lasers to take short-cuts when nescssary. If an enemy tank destroys you, you will appear elsewhere in the maze and the game will continue. Your tank and laser are controlled by the right joystick and fire-button.

(K & K Computorware, 37326 Gregory Drive,Sterling Heights, MI 48077, 16K Ext. Basic, $14.95) —Courtney Noe



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Software Review...

These Two Programs An Arachniphiliac's Delight

Recently, I spent part of my morning playing with spiders, and though the thought of such a creepy pastime might be enough to make a good arachniphobe's skin crawl, I found the experience captivating.

The "spiders" spun out of my CoCo from two separate "webs;" *Spider Attack*, from Ilume Design, and *The Spider,* from Chromatic Software.

Spider Attack, which uses machine language subroutines, and gives you a choice of normal or double CPU speeds, is much like *Space Invaders*, with spiders taking the role of descending aliens. Even at double-speed, it's still fairly easy to roam across the bottom of your screen zapping spiders with your laser, until the red ones begin spitting poisonous venom at you. They're pretty good at this, and since you must be directly beneath one to hit it with your laser, it's quite possible to to take a shrivelling shower of spider spit before you can make him see the light. Also, watch out for the blue spiders. If you stop directly beneath one, he can paralyze you and crawl down to catch you in his killing grasp.

You get at least five tries to rack up points before the spiders kill you for good and the game ends. If you reach 1000 points before losing your fifth life, you will be rewarded by having all five lives returned to you. Your laser is controlled by the right joystick, and I felt the responsiveness was generally good.

Spider Attack has good graphics and decent sound effects; I found it a worthwhile game.

Not wishing to weave any tangled webs by attempting to deceive anyone, I must admit that I personally preferred the second of these eight-legged, action-packed offerings - *The Spider*.

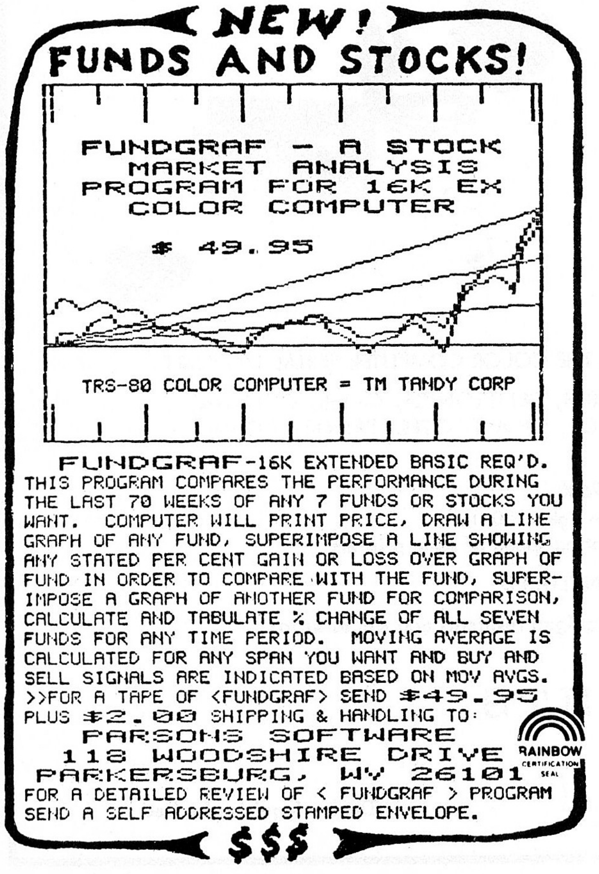
The Spider is an all-machine-language program with very good sound, excellent graphics and super action.

You zoom along through a vividly-colored tunnel that's loaded with exceptionally realistic spiders, attempting to align them with your laser scope and blast them before they get you. I found it quite difficult to hit them, as my point display disconcertingly reminded all who watched, but then it takes these wicked web-wenders awhile to annihilate you the alloted five times, as well. I found this to my liking, because I enjoyed the prolonged action. You use the right joystick to manipulate the cross-beam of your scope, and, of course, the fire button to activate your laser. The point system is adequately explained in the documentation, so I needn't go into that here, except to say that if you manage 500 points you'll receive an extra life to devote to battling these belicose little beasties.

There's one more point I'd like to add here, and that is that, even though it wasn't mentioned in the documentation, playing *The Spider* while wearing a pair of 3-D glasses gives one of the best *dramatic-depth* effects I've yet seen. You lose some of the vivid colors by doing so, but then you can always take them off whenever you want and go back to playing the straight game.

(*The Spider*,Chromatic Software Co., 50 Fillmore St.,Dayton, OH 45410, $19.95; *Spider Attack*,Ilume Design, Dept. E, 4653 Jeanne Nance St., Montreal, Quebec, Canada, $14.95)

—Courtney Noe



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Software Review Update

Now, A More Flexible FLEX

By Dr. Laurence D. Preble

The Color Computer is growing up. These pages are seeing expanding numbers of business software reviews for the TRS-80C. FLEX is a general purpose disk operating system previously available only on mainframe MC6809 computers. In recent months, Spectral Associates, Frank Hogg Labs, Inc., and Data Comp have offered versions of FLEX for the Color Computer.

In the August issue of *the Rainbow*, I discussed the features available in Data Comp's FLEX. The only real disappointment at the time was the lack of communication between Radio Shack's Disk Operating System and FLEX. I weep no more! Data Comp's version 2.1 has bridged the communications gap.

New utility programs are included which allow writing and reading Radio Shack disks from the FLEX operating system. Also, a patch to Radio Shack's Extended Color Basic is included to allow the reading and writing of files on a FLEX disk.

New features have been added to the high resolution graphics screen. The 51 character by 24 line display works faster! You get upper and lower case, a bell sound, addressable cursor and many of the commands available on high priced video terminals.

It is now easier to get into FLEX from Radio Shack Basic. A single bootable disk is created with a utility called MAKESYS. Insert the boot disk into drive 0. Type RUN "FLEX." FLEX announces its presence with a sign-on message. The nice part is that the boot disk does not have to be removed. There is plenty of room on it for FLEX programs.

Keep up the good work folks! IBM and Apple, move over!

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Software Review...

Solo Pool, Fun You Can Bank On

"Two-rail, bank shot in the side pocket--left handed." Calling your shots can be a gas with *Solo Pool,* which, despite the name, can be for one or two players. Making the shot can draw a gasp from over-the-shoulder onlookers, too. Just don't let on you have selected the easiest of the four levels of difficulty available with this entertaining and easy to play video version of pool. You've got to know your angles, though.

In *Solo Pool,* one ball at a time is in play. It's placed randomly and point values are assigned to the six pockets, depending on their distance from, and angle to, the ball. You adjust your cue stick position and take aim by placing a small cross hair behind the ball, and then hit the "fire" button on your joystick to shoot. Of course, there are certain problems. For instance, the closer your cross hair is to the ball, the less distance it will travel; if you're too close, the ball won't reach the hole. And, sometimes, you can't get far enough behind the ball to have a playable shot. No leaning on the table and no foul language allowed. This is a respectable pool hall. In fact, for an extra touch of class, *Solo Pool* treats you to a short rendition of "The Entertainer" from the movie "The Sting,"which, in case you've been in absententia or incommunicado, is a motion picture about "hustling," something you'll be doing once you get the hang of *Solo Pool.*

Since *Solo Pool* is in Basic, you might want to toy around with it and turn it into bumper pool if you have more memory than the 16K it requires--easier to say than do, though. Besides, Tom Mix or his pool shark, John Fraÿsse, are probably way ahead of you and doing it already. They're hustlers.

(Tom Mix Software, 3424 College N.E.,Grand Rapids, MI 49505, $17.95)

-Jim Reed

Software Review...

This Bug's A Doodle Dandy

Wow! I really think they've done it. No more comparing maze games with Pac Man, because *Doodle Bug* is better than Pac Man! *Doodle Bug* has it all: great color, great sound, great action. It has created a sensation here at *the Rainbow* and will probably have to be banned from the premises just to maintain production schedules. Yes, it's that good.

In case I haven't made myself clear, *Doodle Bug* is terrific. The most marvelous feature is that you can slam gates behind you and get away from enemy bugs. The game plan calls for grazing along, eating white dots and assorted vegetables and other key items—if they're the right color when you get to them—all the while avoiding the roaming enemy bugs and steering clear of the stationary skulls, which are poisonous. Anybody who's ever held a joystick should know what to do: eat without being eaten. But, oh, those wonderful gates. You see, about half of the walls of the maze are made of revolving panels which let you through but won't admit enemy bugs. You can have several right on your tail and slam a gate in their faces.

The extra features are many and varied and provide a continuing challenge once you've grown accustomed to the magnificent feeling of power that you get from scooting through those gates one step ahead of destruction. Not only that, but the gates can be shoved around in turnstile fashion to close off normally open passages when the need arises, which is about once every ten seconds. *Doodle Bug* is in machine language and requires 16K.

In addition to all sorts of bonus-points opportunities and chances to get a new supply of ladybugs (your alter ego), there are such features as a freeze-action for time-out. Just in case you're wondering, yes, eat all the dots and you go to a new sequence with different enemy bugs which come out quicker, and eating vegetables gets you more points than the previous screen.

At the moment, nine-year-old Tracy Hirsch is watching while her 12-year-old sister, Lisa, is absolutely going to town. I can't even get Lisa to quit playing long enough to tell me what she likes about *Doodle Bug*. Personally, this reviewer gives it a perfect 10. It's a superior, arcade-quality graphics game.

(COMPUTERWARE, Dept. C, Box 668, Encinitas, CA 92024, $24.95 for tape, or $29.95 for disk)

Jim Reed

Software Review...

Three-Game Pack Is Mostly Fun

This three-game package from Century Software contains two arcade-style games with nicely-done graphics, and an Adventure that I thought had well-prepared responses and a number of other features to aid your enjoyment.

The first of the series, *Moon Lander*, drops you out of moon orbit onto one of three landing pads on the surface. The difficulty in landing varies according to several factors, and points are awarded accordingly. You have a choice of gravity levels, and while the lightest gravity level is the easiest for maneuvering, it uses up the most fuel, and you receive fewer points for successfully positing your Lander upon the chosen pad. Also, the landing pads are located in areas of greatly varied difficulty for maneuvering. Especially since there seems to be a bit of play in the joystick command. The least accessable pad offers the most points. The game is over if you crash five times or run out of fuel. Have fun, but watch your joystick control, and before you attempt your *CLOAD* to the moon be sure to *PCLEAR 6*.

The other graphics game in this trio is called *Balloons*. The object of this game is to pop the falling balloons on the clown's head by guiding him directly beneath them using the joystick control. If a balloon gets by your clown, it definitely gives him a "sinking feeling." Popped balloons rack up points, and if you clear a level of balloons you are awarded an extra clown. Occasionally, after you clear a level you are rewarded with a bonus level.

The adventure game in this series is called *An Unexplored Mansion*. In this adventure, the object is to find the hidden fortune, which is secreted somewhere within the mansion estate. The documentation for this one gives you a list of usable verbs. As the game requires a lot of memory, you will have to do a couple of *POKEs* before *CLOADing*.

(Century Software, 1649 Geneva Ave. No., St. Paul, MN 55119, 16K Ext. Basic, $11.95)

- Courtney Noe

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Graphics...

Nothing's So Constant As Unlimited Change

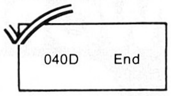
16K ECB

By Ed Pollard

Here is another random graphics program that incorporates constant use of RND to assure ever changing and never-the-same patterns and designs.

You will note that the first line ensures that you are not starting with the same design as the last time you "powered up" your machine.

Although you may have a deadline or appointment to keep, or other excuse to turn it off after a while, you will be tempted to wait for "just one more pattern"....This could last for hours!



The program runs in three phases:

1) The weaving lines
2) The "growing" circles
3) The random circles

All of these actions are mixed with the most important function of the program, hence the function responsible for the overall effect. This is the constant and random changing of both PMODE, SCREEN, and COLOR.

This program has been tested on various groups (usually at parties), and provides a nice background. Especially when there is music playing (although it is not syncronized).

The listing:

```
10 SY=RND(-TIMER)
20 CLS7:PRINT@236,"GRAFXXX";:PRI
NT@265,"BY ED POLLARD";
30 FORI=1TO5000:NEXT
40 POKE65495,0'USE THIS LINE ONL
Y IF YOUR COMPUTER CAN HANDLE IT
 (SPEED UP POKE)
50 IFPEEK(16057)<>50THENCLEAR200
,16048:FORI=33465TO33566:POKEI-1
7408,PEEK(I):NEXTELSE90
60 FORI=0TO2:POKE16061+I,18:NEXT
I:I=16158
70 POKEI,38:POKEI+1,3:POKEI+2,12
6:POKEI+3,131:POKEI+4,34:POKEI+5
,126
80 POKEI+6,164:POKEI+7,76
90 POKE411,62:RUN100
100 PMODE4,1:SCREEN1,1:PCLS
110 FOR F=1 TO RND(10)
120 PMODE RND(5)-1,1:SCREEN 1,RN
D(2)-1
130 COLOR RND(9)-1,RND(9)-1
140 S1=RND(10)+1
150 FOR X=1 TO 255 STEP S1:Y=1:X
1=1:Y1=191-(X/1.33508):LINE(X,Y)
-(X1,Y1),PSET:NEXTX
160 FOR X=1 TO 255 STEP S1:X1=25
5:Y1=X/1.33508:LINE(X,Y)-(X1,Y1)
,PSET:NEXTX
170 FOR X1=255 TO 1 STEP- S1:X=2
55:Y=191-X1/1.33508:Y1=191:LINE(
X,Y)-(X1,Y1),PSET:NEXTX1
180 FOR X1=255 TO 1 STEP -S1:X=1
:Y=X1/1.33508:Y1=191:LINE(X,Y)-(
X1,Y1),PSET:NEXTX1
190 FORI9=1TO1000:NEXTI9:PMODE R
ND(5)-1,1:SCREEN1,RND(2)-1:FORI9
=1TO1000:NEXTI9
200 NEXTF
210 FOR L=1 TO RND(10):PMODE RND
(5)-1,1:SCREEN1,RND(2)-1:C=RND(9
)-1:COLOR RND(9)-1,RND(9)-1:FOR
R= 1 TO RND(100):CIRCLE(128,96),
R,C:NEXTR:NEXTL
220 FOR E=1 TO RND(10):X=RND(255
):Y=RND(191):PMODE RND(5)-1,1:SC
REEN1,RND(2)-1:C=RND(9)-1:C1=RND
(9)-1:COLOR RND(9)-1,RND(9)-1:CI
RCLE(X,Y),RND(100),C
230 PAINT(X,Y),C1,C:NEXTE:GOTO11
```

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Software Review...

Jumps Is A Lively Solitaire

Jumps is a game which proves once again that you don't always need a lot of complex interplay and fast action to be good; that CoCo provides an excellent adaptive form for popular old board games; and that folks with 4K machines can have access to some very good software.

I know that I had at least three versions of this board-and-peg game while I was growing up, and never tired of retrieving it on a day slack of baseball or friends, until too many pegs were lost to make it a challange. If only I could have stored it on cassette tape, instead of under my bed or some other game-eating location where cats and dustmops intrude!

I'm sure most of you have played such a game at some time or other (even with a few lost pegs), but a brief description of the game, as Q Soft has it, appears to be in order.

First of all, good color, sound and graphics belie the smidgeon of storage required to produce this addictive diversion. Once *CLOADed* you get a very nicely done introductory screen, which is a strong hint that considerable care has gone into the preparation of *Jumps*.

Next, there appears a full, top view of the "board and pegs," with an "open hole" in the center of the board.

The object of the game is to jump one peg at a time (you land in an open hole and the computer removes the jumped-peg for you) until either you have just one peg remaining, or you have no more possible jumps. To do this, you use the keyboard arrows to place a cursor on the peg you wish to have jump, press *ENTER*, move the cursor to an open hole one peg away from the jumping peg (on either a vertical or horizontal line - no diagonal jumps allowed) and press*ENTER* once again. When no more jumps are possible, press *N* and a new screen will appear, ready for another game of *Jumps*.

That's all there is to it. Simple, fun and, I might add, for the price, a very good buy.

(Q Soft, 1006 Robinhood Drive, Painesville, OH 44077, $10.95)

—Courtney Noe

Software Review...

Sub-Mission Dives, But Still Floats

Deciding how I felt about *Sub-Mission* nearly whipped me into submission. However, after playing it awhile, I finally adjusted to the problems it was giving me (purely subjective ones, I think), found the difficulty level that best suited my personal proclivities and talents, and warmed to my role as submarine commander.

Once I determined how the game worked, such as how deep your sub can dive and where "near the sub's tail" was the all-important hatch, I found level one to be much too easy for any enjoyment. I then moved immediately on to level three, where I was inevitably blown out of the water whenever I approached my first objective. I settled on level two, by default, and found it to be more my niche.

At this point I suppose I should say just what the objective of this game is that I found best attempted in level two. It is to retrieve the "secret boxes" lying on the ocean floor, without being destroyed by the stationary mines.

Using the right joystick control, you must submerge your boat, avoid the mines, and at the proper instant fire the joystick button to haul in the box. As you can guide your sub up, down and forward, but not in reverse, it can be easy to miss a box as you make your pass. Retrieving it gives you 10 points, getting blown away costs you 10 points and adds them to the enemy's score. The game is over when the red time line travels the width of the screen to the right border.

Sub-Mission has fairly-good sound, including blast noises and sonar bleeps, and good graphics. An enemy ship sits on the surface, adding much to the graphics, but doing no damage, except as the source of the depth charges in level three.

(HIB, 3505 Hutch Place, Chevy Chase, MD 20815, 16K Ext. Basic, $12.95)

—Courtney Noe

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64K Conversion? Now What?

By Jorge Mir

If you recently converted your Color Computer to 64K you probably asked yourself the same questions most of us did: What do I do with it now that I have 64K?

If you have been reading articles devoted to 64K, you undoubtedly have realized that there is a world of new software out there which you never dreamed could be adapted to the Color Computer. But, you must have also realized that the additional software available is quite expensive, since it is devoted mainly to business applications.

What attracted me to 64K was the additional RAM available above the Disk ROM. There is almost 8K of RAM there for the taking. However, I soon realized that it was not that easy to use for Basic programs. I wanted to use that extra space for storing string data, but I finally gave up since I could not find an easy way of doing it.

However, I came up with the idea that if I located my Basic programs in that area, I could then have all of the low 32K RAM available for storage, thus effectively making the Color Computer a 40K machine for Basic programs! Again, I was faced with more problems. Basic programs just cannot be loaded directly into that area. I kept getting "out-of-memory" error messages.

So, I came up with a program that will change the target basic program, relocate it to the upper 32K, and then execute it. Listed below is the latest version of this program.

Here is how to use it:

First, make sure your computer is in the PCLEAR4 mode. This is the mode at power up, but if you want to make sure, just type PCLEAR4 and press *ENTER*.

You then load your basic program and make the changes to the dimension statements so it can handle more data than before. Don't forget, you now have 40K of RAM available!

For example, if your original program had a "*CLEAR 20000*," you can now "*CLEAR 27000*."

Next, you must change the Basic Pointers so that you can load "BASIC64K." You do this by typing the following:

POKE 25, PEEK(27): POKE 26, PEEK(28): NEW ENTER

You can now load "BASIC64K" and type "*RUN*."

The program will accomplish the following:

1) Transfer Basic, Extended Basic and Disk ROM to the upper 32K of RAM and then switch to the 64K RAM mode.

2) Change all program step references in your program so that it runs in the upper 32K section.

3) Transfer your program to the upper 32K section, starting at &HE000.

4) Change Basic Pointers so that execution starts at &HE001 and data is stored beginning at low end of RAM (512 bytes are reserved at the beginning of RAM for machine language subroutines).

5) Execute a "*RUN*" command to start the program.

All of the above will take about one minute. Step 3 above could be replaced by a machine language subroutine to speed things up a bit so that everything could be accomplished in less than 15 seconds.

Here are some rules to observe:

1) You cannot run Basic programs following this procedure if they are longer than 7600 bytes.

2) Once the program has been relocated to upper 32K, you cannot change it. The machine will hang up if you attempt to change it.

3) The high speed mode will not work (at least in my machine), so you will have to remove all "*POKE 65495,0*" statements.

4) Change location of machine language subroutines to the beginning of RAM if you can, so they do not conflict with your Basic program. This is not necessary, but you will maximize space for data by relocating them.

I have been running the above program to convert programs designed to handle large amounts of data (i.e., datafiles, word processors, etc.), and have not had any problems to date. If any of you encounter any problems, I would like to know about it. Please send your comments to *the Rainbow* and they will be forwarded to me.

I hope this program allows many of you with 64K machines to use that upper 8K of "wasted" RAM.

The listing:

```
10 CLS0:PRINT@234,"64K SYSTEM";
20 Y=0
30 D$="1A508E8000A684B7FFDFA780B
7FFDE8CFF0026F1B7FFDF1CAF39"
40 FOR X=1TOLEN(D$)STEP2:SOUND R
ND(200),1
50 A$="&H"+MID$(D$,X,2):A=VAL(A$
)
60 POKE&H7E00+Y,A:Y=Y+1:NEXTX
70 POKE&HFF40,0:EXEC&H7E00
80 FOR X=1TO3:POKE&HC13F+X,ASC(M
ID$("64K",X,1)):NEXTX
90 SOUND100,1:CLS:PRINT @224,"
  CHANGING BASIC PROGRAM"
100 IF PEEK(&HC000)=68 THEN S=&H
2601 ELSE S=&H1E01
110 K=(&HE001-S)/256
120 E=PEEK(25)*256+PEEK(26)-2:X=
S
130 A1=PEEK(X):A2=PEEK(X+1):A=A1
*256+A2
140 POKEX,A1+K:IF A=E THEN POKEX
,&H10:POKEX+1,1:GOTO160
150 X=A:GOTO130
160 CLS:SOUND100,1:PRINT@224,"
    RELOCATING PROGRAM"
170 FOR X=S-1 TO E+1
180 POKE X+(K*256),PEEK(X):NEXTX
190 FOR X=0TO3:POKE&H1000+X,0:NE
XTX
200 IF S=&H1E01 THEN 220
210 POKE25,&HE0:POKE26,1:POKE27,
&H10:POKE28,1:RUN
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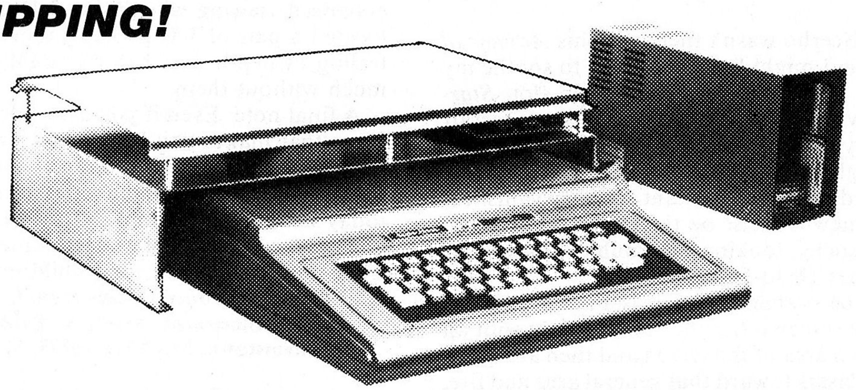

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Software Review...

Being Down in the *Trench* Can Be Uplifting

I well remember, but would like to forget, being in a video arcade one evening and climbing into a game machine that was sort of like a small cockpit. After three quarters' worth of play time, I still didn't know where I was, where the enemy was, where my shell burst were landing or, most importantly, how to find out any of the aforementioned. Well, my solution was to bail out and look for something I felt I could control.

Too bad Fred B. Scerbo wasn't there with his *Advanced Star-Trench Warfare*; I might have been able to soothe my bruised ego and hit something besides the coin slot. *Star-Trench* is a fast-moving game of shoot the alien spacecraft before they shoot you. On giving it a go, to my utter amazement and delight, I was able to mow them down, even though they appeared just for the instant and then vanished, only to reappear somewhere else on the screen. Cruising in the cockpit, feeling cocky, looking for trouble, heading for adventure, here comes Dead-Eye Reed.

Sure, there has to be a catch, and there is, but I'm all for it. Fred has divided the screen into nine zones. If you spot an enemy craft in a given area of the screen and then are quick enough to aim your lasers toward that general area and fire, you'll probably blast the alien and add to your tally which is displayed on the panel above your windshield. On the other hand, if you hold the fire button down, like I do, you'll not only zap the aliens, but also quickly run out of energy and crash into the trench. I figure it's a small price to pay for getting to clobber the enemy for a change. After all, you have six lives to use up, anyhow, and it only costs one life to get a recharge and get airborne again.

Another amazing aspect of *Star-Trench* is that it produces such speed and colorful graphics with Extended Color Basic—not machine language. That means you can modify the game yourself if you want to add a few personal touches to Fred's well-crafted creation. *Star-Trench* can be speeded up even more by using the commands, PCLEAR6:POKE65495,0 before running.

Being a frame-of-reference oriented person, unlike those people who seem to have a gyroscopic ability to always land on their feet and immediately point to the North Star, I like the fact that the cockpit is stationary and that the dash panels and instrumentation give me a feeling of where I am as well as keep the running tabulations of energy left, the number of aliens zapped and all. The colors and graphics add to the fun.

Another feature is that *Star-Trench* has been designed for enhanced viewing when using 3-D glasses (not included). I located a pair of 3-D glasses and using them did provide a feeling of depth, but I think you'll enjoy the game just as much without them.

A final note: Even if you aren't driven, like me, to find a game that makes you look good, *Star-Trench* may be just the thing for young children who can easily become bewildered by the complexities of some of the games on today's market. It's straightforward, easy to understand, and easy to play. All of us need something like that once in a while for reassurance, and children need it to build self-confidence. *Advanced Star-Trench Warfare* provides it.

(IMB, Illustrated Memory Banks, P.O. Box 289, Williamstown, MA 01267-0289, $18.95 on tape.)

Jim Reed

How To Clear All Graphics Pages

You can clear all your graphics pages by entering the following command: *POKE25,6:NEW.* If you do this, you will not be able to use graphics pages, but you will have more program memory.

Caution: Do not try this POKE with any program in memory. It will destroy whatever program is resident in the 80C.

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The software development tools that let you put even more **power** into the already powerful Color Computer. They're full of tools, aids, bells and whistles useful to the BASIC or MACHINE LANGUAGE programmer, in friendly, easy-to-use software packages.

BOTH TOOLKITS CONTAIN . . .

- **Light characters on dark background with Current Line Highlighting**; or normal characters
- **Full Screen Editor** with **Arrow Key controlled cursor; open up space/delete and close up space**
- Enabling selective **Line Renumber/copy/move/merge**; or normal Extended Basic line editor
- **Protect** the current BASIC program from being wiped out with a CLOAD, NEW etc.; or from being LISTed
- **Restore** a protected BASIC program/**Append** any number of BASIC programs together easily
- **Tone** on keypress or normal silent keys (Tone modifiable by use of Sound n,n Command)
- **Global Search** of command or text strings in BASIC programs with **wildcard** character and **next "."**
- **9 Screen Print Delays** with keyboard override (for slow, readable LISTings and DISK DIRectories)
- **Variable Name List**/String-Byte memory usage/Range of FREE MEM/Top of memory address display
- Fast Machine Code to BASIC DATA **converter** for storing machine code visibly in BASIC
- (C)SAVEM address/**Backup Tool** (Last file name, start, end and execute address)
- **Recovery of Lost BASIC** programs after NEW, BACKUP, DSKINI, etc.
- **Break Key Disable/Enable** (Pause keys still available)
- **Modified TRON** display (.LN replaces (LN)

THE FULL TOOLKIT ALSO CONTAINS . . .

☐ **Merge BASIC** with Machine Code routines so machine code is "invisible" and (C)SAVE/(C)LOADable
☐ **9 BASIC RUN delays** with keyboard override; **Single Step(s)** mode with current line number display
☐ **Memory Examine/Modify** with HEX/ASCII/DEC/Double Decimal output and HEX/ASCII input
☐ Memory **Block Move** for relocating machine code programs, DATA blocks, etc.; or the Kit itself
☐ **Ten User Defined Function Keys** accessable with @/number (BASIC Macros/Block storage)
☐ **Automatic linefeed** for printers that don't/double space LISTings; or normal PRINT
☐ **Delete all spaces** (not in PRINT strings, DATA or REMARK lines)
☐ ASCII/HEX memory **Dumps** to screen or printer
☐ **Delete all REMarks** (either REM or ' type)
☐ Parallel **ECHO** of screen output to printer

THESE FEATURES ARE FOUND ON BOTH VERSIONS . . .

— **Transparent** to the user, Install it and forget it until you need it
— BASIC runs up to one-third faster through the Toolkit (5-10% typical)
— **HELP** command lists all Kit commands and current Kit address
— Same program works with tape or disk and in 16 or 32K
— Entire system totally **removable** at any time
— **Compatible** with other utility programs
— Green/Orange text screen capability
— Easily **modifiable** command syntax

The Kits are relocatable programs that load any time without bothering your BASIC program or variables or top of memory address. All tools may be turned on or off at will, including the Kit itself.

The tools are available with simple three or four letter commands entered in the direct mode, with the entire instruction set viewable through the HELP command.

The Colorkit is 5K bytes for $29.95
Available on disk with handy BASIC Kit loader for additional $5

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The Microkit is 2.5K bytes for $27.95
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THE GOOD LIFE $16.95

The Classic Game of Life With:

- 64x64 color symmetrical display
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- **One key view/copy/load(m) of files**
- **Two key kill/rename of files**
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- **Directory keyword search of filename**
- **Print DIR with machine code address**
- **Recover killed files**

DEER HUNT $15.95

- **Arcade shoot-em-up skill game**
- **Aim only for the deer**
- **Avoid hitting people, cars, train**
- **Will not cause tension headache**
- **BASIC/machine code hybrid**
- **Tape/Disk compatible**

ARIZIN
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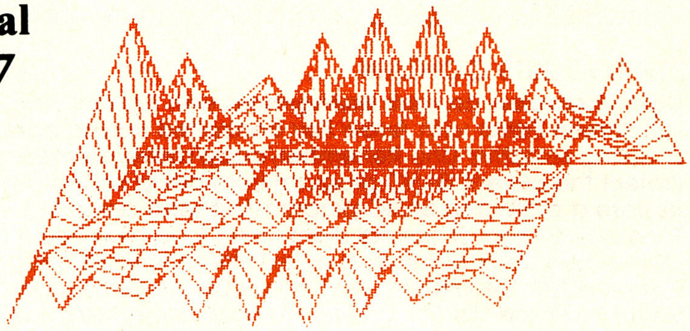
Scottsdale, AZ 85252

Create Three-Dimensional Graphics with *Sar 27*



by Ed Krikorian

16K ECB

"Earth to *Sar 27*...It looks as though you've either landed on the moon, are caught in a space warp, or possibly are being sucked into a black hole. We advise a dump-to-printer and return home. Over..."

Sar 27 creates those bizarre three-dimensional landscapes you see so often in ads for advanced computers. This program allows the user to input the initial parameters, and then draws the resulting image in the PMODE 4,1 HI-RESOLUTION mode. The user can create mountains, valleys and even objects looking like those crazy black holes.

I would highly recommend that the user make screen dumps to his printer as these objects look excellent when hard-copied. The only actual graphics commands used are PSET, LINE, SCREEN, PMODE, AND PCLS. The only upper level function used is the SINE, in which the user can vary the amplitude, period and frequency of the initial curve. The program not only demonstrates some of the things you can do with the SINE, but also demonstrates the trick behind some of those fancy three-dimensional graphs.

THE COMPOSER

SPEECH SYSTEMS, A MANUFACTURER OF SPEECH, MUSIC, AND SOUND EFFECT SYNTHESIZERS FOR THE SS-50 BUS, INTRODUCES THE COMPOSER FOR THE COLOR COMPUTER. THE COMPOSER IS A 4 VOICE MUSIC COMPILER WHICH ALLOWS ONE TO EASILY DEVELOP MUSIC. EACH VOICE USES ITS OWN WAVESHAPE TABLE. BOTH A BASIC AND A MACHINE LANGUAGE PROGRAM ARE INCLUDED, NO ADDITIONAL HARDWARE IS NECESSARY. THE COMPOSER ALLOWS THE ORGINAL MUSICAL SCORE TO BE SAVED. IN ADDITION, THE COMPILED MUSIC MAY BE SAVED AND BEST OF ALL IT MAY BE PLAYED WITHOUT ANY OTHER SOFTWARE. EXAMPLES OF HOW THE COLOR COMPUTER CAN BE USED TO REPRODUCE SOUND EFFECTS ARE ALSO INCLUDED. YOU HAVE TO HEAR THE DIFFERENCE TO REALLY COMPARE, BUT JUST LOOK AT SOME OF THESE FEATURES:

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DOUBLE DOTTED..........	YES	NO
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QUARTER NOTE TRIPLETT..	YES	NO
EIGTH NOTE TRIPLETT....	YES	NO
THIRTY SECOND NOTE.....	YES	NO
SOUND EFFECTS..........	YES	NO

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BATAVIA, IL 60510

PROGRAM VARIABLE DICTIONARY

PI: Value of the complex number PI.

K: One of the variables that controls the period and frequency. ABS(K)/(2*PI)=FREQ) (2*PI)/ABS(K)= PERIOD.

A: AMPLITUDE of SINE wave.

AO: Amount of change in curves' AMPLITUDE. NOTE: This value is added to old AMPLUTUDE after every curve has been drawn.

OO: This is the amount of change in height of the following curves.

CU: Number of curves where AMPLITUDE is incremented by (AO). Also (OF) is decremented by (OO).

CX: Number of curves where AMPLITUDE gets OO subtracted from it. Also (OF) is incremented by (AO).

G: Shift in curve starting position gives different vantage points.

E: STEP amount for main loop. The lower the value, the more connecting lines will emerge.

OF: Initial height of first curve.

S1,S2: Start and stop values for main loop. Try using -30 to 58.

XO: Horizontal shift factor

The first part of the program draws curves with lift being decremented and AMPLITUDE being incremented by (AO). The horizontal shift is incremented by (G).

The second part of the program draws curves with LIFT being incremented by (AO) and AMPLITUDE being decremented by (OO). Horizontal shift is the same. Note: The user can vary (K) by changing line 100's value for (K).

Sample input: AMPLITUDE=2.5, LIFT=3, UP-CURVES=5, DOWN-CURVES=4, SHIFT=5, STEP=4, INITIAL HEIGHT=150, DOMAIN of X=30,58.

The listing:

04E4 End

```
1 REM SAR27 BY ED KRIKORIAN
2 REM 604 SWEETWATER BLVD.,N.
3 REM LONGWOOD, FLORIDA
4 REM       32750
5 REM *USES HIGH SPEED POKE.
6 REM DELETE LINES 120 AND 470
7 REM IF YOUR SYSTEM LACKS
```

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A work-text containing — instruction, examples, illustrations, programs, and many practice exercises. 3 Units — Basic, Graphics, and Sound. 24 chapters to teach you what you need to know to begin reading, understanding, and writing your own programs. Answer Key included with each book. Great book for beginners. **$4.95 NEW LOW PRICE plus 50¢ postage**

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User Modifiable.

PLEASE SPECIFY LANGUAGE AND VERSION

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Learn to recognize the letters of the Hebrew alphabet. Each letter graphically displayed. Help command, vocabulary words included.

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Learn to make purchases. Graphic displays of items kids love. Player buys using dollars and coins to practice using money correctly. Solutions given.

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Menu driven, 2 level program provides practice in adding or subtracting 2 digit numbers. Vertical format for proper entry of digits in the answers. Report card scoring.

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16K Ext. $11.95
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PRESCHOOL PACK 3 by Joseph Kolar
16K Ext. $11.95
Alpha-Byte: Programs designed to teach recognition and identification of the alphabet. Attractive hi-res graphics.

MUSIC MARVEL 16K Ext. Basic $9.95
Play 2 familiar children's songs. Large graphic displays. No reading or musical ability needed. Great for pre-schoolers. 16K version also available. Please specify.

```
8 REM HIGH SPEED CAPABILITY.
10 DIM N(200,2)
20 PI=3.1415926:K=.08
30 A=0:OF=125
40 INPUT"AMPLITUDE.LIFT";AO.OO
50 INPUT "K VALUE";K
60 INPUT"NUMBER OF UP-CURVES";CU
70 INPUT"NUMBER OF DOWN-CURVES";
CX
80 INPUT"SHIFT,STEP";G,E
90 INPUT"INITIAL HEIGHT(0-191)";
OF
100 INPUT"DOMAIN OF X";S1,S2
105 INPUT "CROSS LINES (1=NO)";C
L
110 PMODE 4,1:PCLS:SCREEN 1,0
120 POKE 65495,0
130 FOR PL=1 TO CU
140 NC=0
150 FOR X=S1 TO S2 STEP E
160 Y=A*SIN(K*X)
170 IF PO=0 THEN 190
180 LINE(X+60+XO,OF-Y)-(XX,YY),P
SET
185 IF CL=1 THEN 250
190 IF FL=0 THEN 210
200 LINE(X+60+XO,OF-Y)-(N(NC,0),
N(NC,1)),PSET
210 N(NC,0)=X+60+XO:N(NC,1)=OF-Y
220 IF FL=1 THEN 240
230 PSET(X+60+XO,OF-Y,1)
240 NC=NC+1:PO=1
250 XX=X+60+XO:YY=OF-Y
260 NEXT X
270 A=A+AO:OF=OF-OO:XO=XO+G:FL=1
280 PO=0
290 NEXT PL
300 FOR PL=1 TO CX
310 NC=0
320 FOR X=S1 TO S2 STEP E
330 Y=A*SIN(K*X)
340 IF PO=0 THEN 360
350 LINE(X+60+XO,OF-Y)-(XX,YY),P
SET
355 IF CL=1 THEN 420
360 IF FL=0 THEN 380
370 LINE(X+60+XO,OF-Y)-(N(NC,0),
N(NC,1)),PSET
380 N(NC,0)=X+60+XO:N(NC,1)=OF-Y
390 IF FL=1 THEN 410
400 PSET(X+60+XO,OF-Y,1)
410 NC=NC+1:PO=1
420 XX=X+60+XO:YY=OF-Y
430 NEXT X
440 A=A-OO:OF=OF+AO:XO=XO+G:FL=1
450 PO=0
460 NEXT PL
470 POKE 65494,126
480 GOTO 480
```

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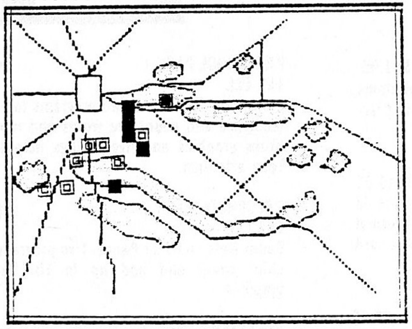
A Strategy Game
for mature Players

STOP REBEL INVADERS
OR DIE!

16K ext.
joystick



$ 20.95
cassette

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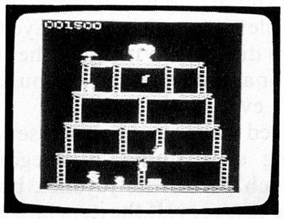
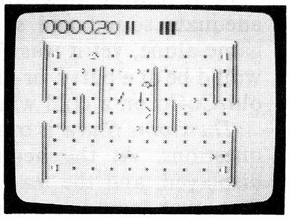
Listing 2:

```
10 RA=90:PI=3.1415926
20 INPUT "NUMBER OF SIDES";S
30 INPUT "OFFSET";PL
40 INPUT "RADIUS<90";RX
50 INPUT "STEP";DD
60 INPUT "ROTATE";TT
70 PMODE 4,1:PCLS
80 SCREEN 1,0
90 FOR RA=10 TO RX STEP DD
100 FOR N=TT TO S*2+TT STEP 2
110 X1=128+RA*(COS((N+OF)*PI/S))
120 Y1=96-RA*(SIN((N+OF)*PI/S))
130 X2=128+RA*(COS(((N+OF)+4)*PI
/S))
140 Y2=96-RA*(SIN(((N+OF)+4)*PI/
S))
150 LINE(ABS(X1),ABS(Y1))-(ABS(X
2),ABS(Y2)),PSET
160 NEXT N
170 OF=OF+PL
180 NEXT RA
190 CIRCLE(128,96),RX,1,1
200 GOTO 200
```



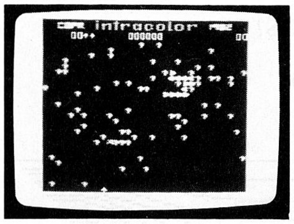
DUNKEY MUNKEY

Dunkey Munkey, has kidnapped Ruby. If you make it through the first level, trying to rescue her there's two others filled with thrills and excitement. With two action packed screens and three levels of play DUNKEY MUNKEY's great for arcade buffs
TAPE... $21.95 DISK... $26.95



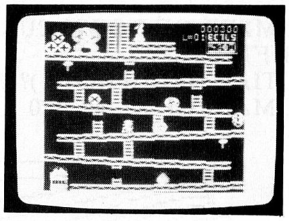
PACDROIDS

With its space theme, the Super Saucer lays destructomines and the Super Bomb that disintegrates everything in your path, right up to the wall. The maze changes every 10,000 points as the difficulty escalates. 1-4 players.
Tape **$19.95**



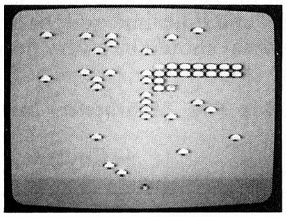
COLORPEDE

Colorpede has a variety of bugs ranging from a tiny bettle to the gigantic colorpede. Colorpede has better graphics than Katerpillar but the sound is not as good. Colorpede also has a more varied and complicated play routine.
Tape **$29.95**



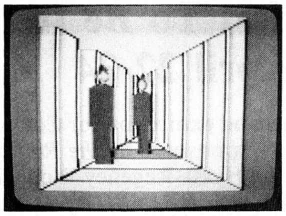
DONKEY KING

Using the four stages from the original acrade game, with your joystick in hand try to jump the barrels, collect the pins, manuever your way past the falling jacks, and figure out the crazy conveyor belts. Written by Tom Mix, this ones sure to become a classic!
Tape... $24.95 Disk... $27.95



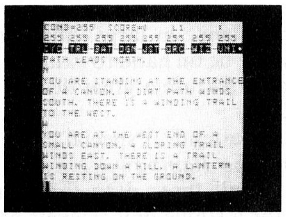
Katterpillar Attack

Modeled after the popular arcade game, Centipede. This is a well written game. It has slightly larger graphics and better sound than Colopede. It is also simpler to play than Colorpeed.
Tape... $24.95 Disk... $27.95



PHANTOM SLAYER

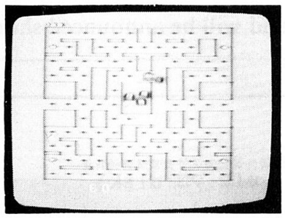
You must chase the phantoms and kill them with your assortment of weapons. This is a graphics type maze/adventure game with full screen three dimensional graphics. You are armed with a laser pistol, and proximity detector.
Tape **$19.95**



```
COND=255  SCORE=0    L1       
255 255 255 255 255 255 255 255
    TRL BAT                 UNI
PATH LEADS NORTH.
*
YOU ARE STANDING AT THE ENTRANCE
OF A CANYON. A DIRT PATH WINDS
SOUTH. THERE IS A WINDING TRAIL
TO THE WEST.
*
YOU ARE AT THE WEST END OF A
SMALL CANYON. A SLOPING TRAIL
WINDS EAST. THERE IS A TRAIL
WINDING DOWN A HILL. A LANTERN
IS RESTING ON THE GROUND.
```

KEYS OF THE WIZARD

A fast action, machine language adventure game filled with tricks, traps, treasures and creatures all of which are randomized at the beginning of each adventure so that no adventure will ever be exactly the same. There are three different skill levels.
Tape **$19.95**



GHOST GOBBLER

Ghost Gobbler is an excellent version of Pac-Man™. You must gobble all the food dots while avoiding the ghosts. There are four energizer dots which will make the ghosts turn blue and become scared. This is the best copy of the arcade game.
Tape **$14.95**

Now you can deduct up to 20% on the price of games: buy any 2 games deduct 10%, buy any 3 games deduct 15%, buy any 4 games deduct 20% from games prices.

TOP TEN

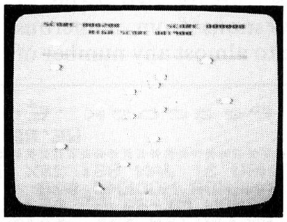
1.) **COLORPEDE** by Intracolor
2.) **PLANET INVASION** by Spectral Assoc.
3.) **DONKEY KING** by Tom Mix
4.) **ASTRO BLAST** by Mark Data
5.) **PACDROIDS** by Programers Guild
6.) **SPACE RACE** by Spectral Assoc.
7.) **DUNKEY MUNKEY** by Intellectonics
8.) **STARFIRE** by Intellectonics
9.) **HAYWIRE** by Mark Data
10.) **GHOST GOBBLER** by Spectral Assoc.

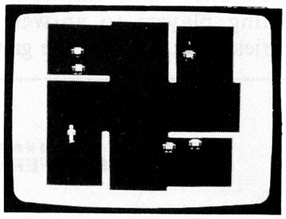
INVADERS REVENGE

You, as the last remaining space Invader, must battle the human ships that prowl the space lanes, and avoid the laser station that seeks to destroy you. A great game from Med. Systems. Reverses the roll in space invaders you attack the laser bases.
Tape **$19.95**

HAYWIRE

This is Mark Data's version of Beserk™. Super Colors and dynamite sound effects in this fast paced arcade game for one or two players. The exciting combination of angry robots an the Indestructible Menace will provide hours of action filled fun.
Tape **$24.95**





COMPUTER SHACK

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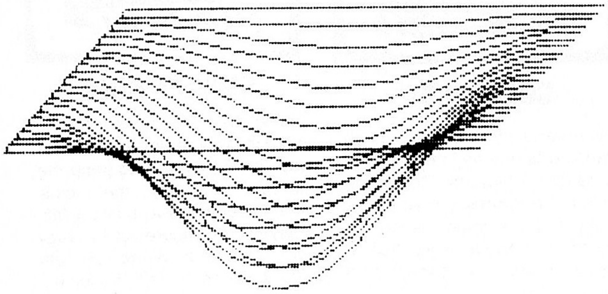
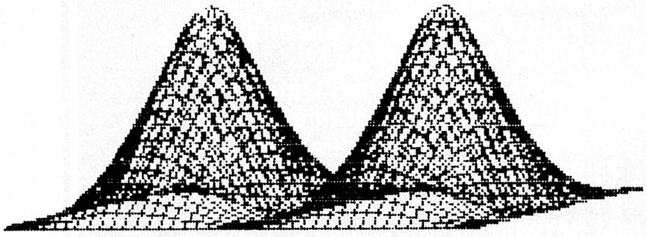
```
AMPLITUDE, LIFT? -5, -2.5
K VALUE? .04
NUMBER OF UP-CURVES? 7
NUMBER OF DOWN-CURVES? 15
SHIFT, STEP? 2, 8
INITIAL HEIGHT(0-191)? 100
DOMAIN OF X? -40, 120
```



```
WITHOUT CROSS LINES
AMPLITUDE, LIFT? 2.5, 3
K VALUE? .08
NUMBER OF UP-CURVES? 15
NUMBER OF DOWN-CURVES? 15
SHIFT, STEP? 2,4
INITIAL HEIGHT(0-191)? 150
DOMAIN OF X? -20,140
```



Software Review...

The Game Show Is, Catagorically, A Winner

You won't have to go to Hollywood to play the game shows on television if you have this clever program from Genesis Software.

Called *The Game Show*, it's set up for two teams of competing players to answer questions from numerous categories, thus opening the game to almost any number of participants. And you're definitely doing it on TV, even if Neilson may never find you.

In reviewing this 16K Extended Basic feature (it has adequate sound and some clever graphics), I played the game alone, yet it wasn't too difficult to imagine the fun it would be at a party, or just for a family gathering 'round the old CoCo on a cold winter's eve.

The Game Show is organized into four 15-round series of questions. At the beginning of a round, a category is displayed, and the team which presses its joystick button first must name an item in the category. If the item named by the first team is not the highest-priority answer, the other team is given the next opportunity to guess. And, if the playing team doesn't name all the items in the category before the third wrong guess, the other team is given one chance to name any of the remaining items. If the other team *does* name one of the remaining items, it receives all the points for that round. Otherwise, the first team receives all the points.

Not only are you competing against the other team, but also against time.

The desire to perform well in front of a friendly group, and the demands of a thirty-second time limit add the drama and excitement to make this what should be a very popular game offering from Genesis.

(Genesis Software, P.O. Box 936, Manchester, MO 63011, $19.95)

—Courtney Noe

RAINBOWfest To Be In Chicago April 22-24

The very first national show and exhibition for CoCo will be held in Chicago April 22-24, sponsored by *the Rainbow*.

RAINBOWfest will be at the Hyatt-Regency Woodfield, west of the downtown area. The *RAINBOWfest* site is adjacent to Woodfield Mall—the world's largest shopping center.

According to preliminary plans, a large number of software and hardware firms will be on hand to exhibit their products. The meeting will also feature a great deal of fun and conversation about CoCo.

We urge you to make plans to attend. A special hotel rate can be secured by mentioning *the Rainbow*.

Admission will be $7.50 for all three days through an advance sale, or $5 per day for a single day. Tickets at the door will be $11 for the entire session or $7.50 for a single day.

Other events are planned and will be announced shortly.

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```

Educational graphics...

A Graphic Look At Basic Trigonometry

16K
ECB

By Carlos Rumbaut

We at the Rainbow *are seeing an increasing flow of educational programming of late, and view this trend with justifiable optimism.*

Examples, such as the recent submission listed here, are helping strengthen the color computer as a respected educational tool.

The program, *Trigshow*, uses high-resolution graphics and animation to provide dynamic illustrations of some basic concepts in geometry and trigonometry. Although best used as an auxiliary introduction to these concepts in a study of geometry, it can also be helpful to those with a limited working knowledge of them.

Instructions throughout the program make it self-explanatory to the user. A list of topics is shown on the CRT; selecting one brings up the section's "title page," where the particular concept is defined. Following this comes an explanation of the graphics display, followed by the display itself. The section ends with a multiple-choice quiz. Each step or "page" is summoned by the space bar, so the user goes at his/her own pace.

Trigshow is around 8K long. Extended Basic and at least 16K RAM is required.

Listing 1:

1E28	End
15D9	3999
0F8B	2999
0951	1999

```
1 '**        TRIGSHOW        **
3 '**  BY CARLOS RUMBAUT     **
4 '**      JULY, 1982        **
10 DIM N$(6):N$(0)="E2F2G2H2"
11 N$(1)="BR2U2D4"
12 N$(2)="BD3L3U3R3U3L3"
13 N$(3)="D3L3BU6R3D3L2"
14 N$(4)="D6U3L3U3"
15 N$(5)="R3L3D2R3D3L3"
16 N$(6)="D6R3U3L3"
18 AN$="U8R4D4L4R4D4BR4BU3R3BU3L
3R3BU2BR3":S$="D8R4U3L4":F$="BD8
R4U4L4U4R4BR4R4D8BR3R1BR3R4U4L2R
2U4L4"
20 PI=3.1416:PI$="BU2R3D4U4R4D4U
4R3":P2$="R2D3L2D3R2BU3BR3"+PI$
21 PMODE4,1:CLS
25 PRINTSTRING$(10,168)" TRIG SH
OW "STRING$(11,164);
30 PRINTSTRING$(32,227)
35 PRINT:PRINT:PRINT"      THIS P
ROGRAM EXPLAINS AND"
40 PRINT"ILLUSTRATES SOME  FUNDA
MENTAL"
45 PRINT"CONCEPTS IN TRIGONOMETR
Y, THEN"
50 PRINT"GIVES A SHORT QUIZ AFTE
R EACH   SECTION."
55 PRINT:PRINT" TO 'TURN THE PAG
E', PRESS THE  SPACE BAR.  PRESS
ING <SHIFT @>  FREEZES CURRENT D
ISPLAY UNTIL   ANOTHER KEY IS PR
ESSED."
60 IF INKEY$=""THEN60
65 CLS:PRINT@10,"- FOREWORD -"
70 PRINT:PRINT:PRINT"  TRIGONOME
TRY WAS FIRST THOUGHTUP TO MEASU
RE RATIOS WITHIN TRI-ANGLES."
75 PRINT"   A VERY HANDY APPLICA
TION IT  HAS COME TO HAVE IS TO
RELATE   CIRCULAR MEASUREMENTS T
O LINEAR ONES."
80 PRINT:PRINT"  THIS MAKES CIRC
LES AND CURVES MUCH MORE MANAGEA
BLE."
90 IF INKEY$=""THEN90
200 CLS:PRINT:PRINT:PRINT"SELECT
IONS:"
205 PRINTSTRING$(11,204)
210 PRINT:PRINTTAB(10)"1. PI"
220 PRINTTAB(10)"2. RADIANS"
230 PRINTTAB(10)"3. SINE"
240 PRINTTAB(10)"4. COSINE"
255 PRINT:PRINT"TO RETURN TO THI
S LIST, TYPE <L>";
260 PRINTSTRING$(32,195)+STRING$
(32,236);
270 INPUT "WHICH WOULD YOU LIKE"
;I
280 ON I GOTO 1000,2000,3000,400
0:END
999 '
1000 CLS:T$="PI":GOSUB 6000
1005 PRINT:PRINT"WHERE DOES PI C
OME FROM?"
1010 PRINT" PI IS THE NUMBER OF
DIAMETERS  THAT FIT ALONG THE CI
```

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```
RCUMFERENCE OF A CIRCLE."
1020 PRINT:PRINT"THE NEXT PAGE S
HOWS A CIRCLE OF DIAMETER 1 ROLL
ED OUT THE LENGTH OF ITS CIRCUMF
ERENCE, 3.14159  (APPROXIMATELY)
."
1055 GOSUB 6160
1095 PCLS:SCREEN 1,1
1100 LINE(32,150)-(220,150),PSET
1105 LINE(34,90)-(34,150),PSET
1110 CIRCLE(34,158),3
1120 DRAW "BM216,157"+PI$
1130 FOR X=0 TO 2*PI STEP PI/12
1140 C=34+30*X:S=.25+X/(2*PI)
1145 IF S>1 THEN S=S-1
1160 CIRCLE(C,120),30,1,1,S,.25
1165 SOUND C,1
1170 IF X=0 THEN 1200
1190 CIRCLE(C,120),30,0,1,S,.25
1200 NEXT X
1210 GOSUB 6160
1220 CLS:T$="QUIZ":GOSUB 6000
1225 IF LEFT$(R$,1)="Y"THEN1095
1230 PRINT:PRINT"   HOW MANY RAD
II WILL FIT ALONG THE CIRCUMFERE
NCE OF A CIRCLE?"
1240 A$="6":B$="2*PI":C$="PI/2":
R$="B":GOSUB6060
1280 PRINT:PRINT"WHAT IS THE DIA
METER OF A CIRCLEWITH A CIRCUMFE
RENCE OF 31.4159?"
1290 A$="10":B$="2*PI":C$="20":R
$="A":GOSUB6060
1320 PRINT:PRINT"   WHICH FORMUL
A FOR THE CIRCUM-FERENCE OF A CI
RCLE IS CORRECT?"
1321 PRINT"(R=RADIUS)"
1330 A$="C=PI*R^2":B$="C=PI*R/2"
:C$="C=PI*R*2":R$="C":GOSUB6060
1410 IF INKEY$="" THEN 1410 ELSE
 200
1999 '
2000 CLS:T$="RADIANS":GOSUB 6000
2010 PRINT:PRINT"   AN ANGLE IS
 THE SIZE OF ONE RADIAN WHEN IT
MARKS OFF AN ARC THE SIZE OF ONE
 RADIUS."
2020 PRINT"REMEMBER YOU CAN FIT
2*PI RADII ALONG THE CIRCUMFEREN
CE.  THERE-FORE, 2*PI RADIANS WI
LL FIT IN- SIDE OF A CIRCLE."
2025 GOSUB 6160
2030 CLS:PRINT:PRINT"   THE NEXT
 PAGE SHOWS A CIRCLE MARKED FIRS
T IN WHOLE RADIANS,  THEN IN FRA
CTIONS OF PI RADIANS."
2035 PRINT"THESE LATTER CORRESPO
ND TO THE  STANDARD ANGLES OF 45
, 60, 90,  ETC., DEGREES."
2040 GOSUB 6160
2045 PCLS:SCREEN 1,1
2050 CIRCLE(128,96),45
2053 FOR X=4 TO 104 STEP 4
2055 FOR X=0 TO 6
2060 LINE(128,96)-(128+COS(X)*45
,96-SIN(X)*45),PSET
2061 NEXT X
2062 CIRCLE(180,96),3:PLAY"C"
2063 DRAW"BM155,54"+N$(1):PLAY"D
"
2064 DRAW"BM107,51"+N$(2):PLAY"E
"
2065 DRAW"BM78,89"+N$(3):PLAY"F"
2066 DRAW"BM95,134"+N$(4):PLAY"G
"
2067 DRAW"BM142,144"+N$(5):PLAY"
A"
2068 DRAW"BM176,110"+N$(6):PLAY"
B"
2075 FOR T=1 TO 1500:NEXTT
2080 PCLS:CIRCLE(128,96),45
2085 DRAW"BM128,96;R45":CIRCLE(1
80,96),2
2090 DRAW"BM128,96;E32;BU4"+PI$+
"BR4NG3BR6"+N$(4)
2091 SOUND 91,4
2095 LINE(128,96)-(151,57),PSET:
DRAW"BM151,52"+PI$+"BR4NG3BR6BD2
"+N$(3)
2096 SOUND 96,4
```

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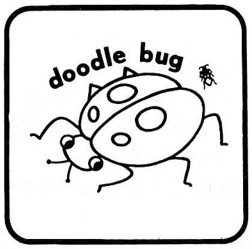

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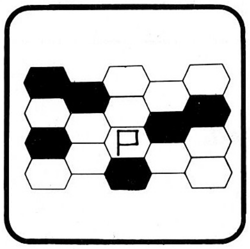

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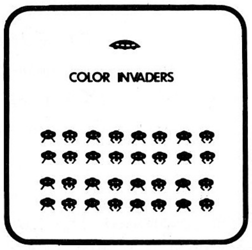

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```
2100 DRAW"BM128,96;U45BU7BL7"+PI
$+"BR4NG3BR6BD2"+N$(2)
2101 SOUND 101,4
2105 DRAW"BM128,96;L45BL13"+PI$
2106 SOUND 106,4
2110 DRAW"BM128,96;D45;BD6BL8"+N
$(3)+"R2BR2"+PI$+"BR4NG3BR6BD2"+
N$(2)
2111 SOUND 111,4
2115 CIRCLE(180,96),2,0
2120 DRAW"BM178,96"+P2$
2121 SOUND 121,4
2130 GOSUB 6160
2160 CLS:T$="QUIZ":GOSUB6000
2165 IF LEFT$(R$,1)="Y"THEN2045
2170 PRINT:PRINT"   HOW MANY DEG
REES ARE THERE INPI RADIANS?"
2180 A$="180":B$="60*PI":C$="90"
:R$="A":GOSUB 6060
2220 PRINT:PRINT"HOW MANY RADIAN
S ARE THERE IN A 90-DEGREE ANGLE
?"
2230 A$="1.5":B$="90-PI":C$="PI/
2":R$="C":GOSUB 6060
2235 PRINT:PRINT"HOW MANY DEGREE
S ARE THERE IN A RADIAN?"
2240 A$="180/PI":B$="2*PI":C$="P
I/180":R$="A":GOSUB 6060
2250 IF INKEY$="" THEN 2250 ELSE
 200
2999 '
3000 CLS:T$="SINE":GOSUB 6000
3010 PRINT@53,CHR$(140):PRINT@83
,CHR$(140)+STRING$(2,128):PRINT@
113,CHR$(140)+STRING$(4,128)
3020 PRINT@132,"HYPOTENUSE "+CHR
$(140)+STRING$(6,128)
3030 PRINT@173,CHR$(140)+STRING$
(8,128)+" OPPOSITE"
3040 PRINT@203,CHR$(140)+STRING$
(10,128)
3050 PRINT@229,"(A) "+CHR$(140)+
STRING$(12,128)
3060 PRINT@267,"ADJACENT"
3070 PRINT:PRINT"    THE TRIGONO
METRIC FUNCTIONS,LIKE SINE, RELA
TE AN ANGLE(A) TOTHE LENGTHS OF
THE SIDES OF ITS RIGHT TRIANGLE.
"
3080 GOSUB 6160
3100 CLS:PRINT:PRINT"THE SINE OF
 AN ANGLE IS EQUAL TOTHE RATIO O
F THE LENGTHS OF THE OPPOSITE SI
DE TO THE HYPOTENUSE.  SINE = OP
POSITE / HYPOTENUSE"
3200 PRINT:PRINT"  IN A CIRCLE O
F RADIUS ONE, THEHYPOTENUSE IS 1
 AND SO THE SINE OF AN ANGLE EQU
ALS ITS OPPOSITE SIDE."
3210 PRINT"THE NEXT PAGE PLOTS T
HE OPPOSITESIDE ALONG A LINE WHI
CH LINEARLYREPRESENTS RADIANS."
3220 GOSUB 6160
3250 PCLS:SCREEN1,1
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```
3300 LINE(10,90)-(240,90),PSET
3310 LINE(82,90)-(95,90),PRESET
3320 LINE(10,175)-(240,175),PSET
3330 LINE(82,175)-(95,175),PRESE
T
3340 DRAW"BM12,179;R1;BR3;U2D4"
3350 CIRCLE(45,179),3:CIRCLE(97,
179),3
3360 DRAW"BM75,177;D4"
3370 DRAW"BM167,179"+PI$:DRAW"BM
235,177"+P2$
3380 CIRCLE(45,90),30
3390 FOR X=0 TO PI*2 STEP PI/15
3395 H=45+COS(X)*30:V=90-SIN(X)*
30
3400 LINE(H,90)-(H,V),PSET
3405 LINE(95+23*X,V)-(95+23*X,90
),PSET
3410 LINE(H,V)-(45,90),PSET
3415 SOUND 150+SIN(X)*60,1
3420 IF X>0 THEN LINE(45,90)-(H,
V),PRESET
3425 IFX>PI THEN LINE(10,90)-(82
,90),PSET
3428 LINE(H,V)-(H,90),PRESET
3430 NEXT X
3440 GOSUB 6160
3450 CLS:T$="QUIZ":GOSUB 6000
3455 IF LEFT$(R$,1)="Y"THEN3250
3460 PRINT:PRINT"   AFTER WHAT N
UMBER OF RADIANS DOES THE VALUE
OF SINE TURN NEG-ATIVE?"
3470 A$="0":B$="PI":C$="2*PI":R$
="B":GOSUB 6060
3480 PRINT:PRINT"   AT WHAT ANGL
E IS SINE AT ITS HIGHEST POINT?"
3490 A$="0":B$="PI/2":C$="-PI/2"
:R$="B":GOSUB 6060
3500 PRINT:PRINT"WHAT IS THE SIN
E OF 3*PI/2?"
3510 A$="0":B$="1":C$="-1":R$="C
":GOSUB6060
3520 IF INKEY$=""THEN 3520 ELSE
200
3999 '
4000 CLS:T$="COSINE":GOSUB 6000
4010 PRINT:PRINT"THE COSINE OF A
N ANGLE IS EQUAL  TO THE RATIO O
F THE LENGTHS OF THE ADJACENT SI
DE TO THAT OF THE HYPOTENUSE. TH
AT IS:              COSINE=ADJAC
ENT/HYPOTENUSE"
4020 PRINT"   TO SHOW HOW ANGULA
R MEASURE  CORRESPONDS TO THE CO
SINE ON THENEXT PAGE, THE CIRCLE
 IS PLOTTEDWITH A VERTICAL X-AXI
S."
4030 PRINT"THIS MAKES THE ADJACE
NT SIDE OF THE ANGLE VERTICAL."
4040 GOSUB 6160
4050 PCLS:SCREEN 1,1
4060 LINE(95,90)-(240,90),PSET:
LINE(45,57)-(45,123),PSET
4070 DRAW"BM81,120;R1;BR3;U2D4"
4080 CIRCLE(85,90),3:CIRCLE(97,1
49),3
4090 DRAW"BM85,60;D4":DRAW"BM167
,149;"+PI$:DRAW"BM235,147"+P2$
4100 CIRCLE(45,90),30
4110 FOR X=0 TO PI*2 STEP PI/15
4115 H=45-SIN(X)*30:V=90-COS(X)*
30
4120 LINE(H,V)-(45,V),PSET
4125 LINE(95+23*X,V)-(95+23*X,90
),PSET
4130 LINE(45,90)-(H,V),PSET
4135 SOUND 150+COS(X)*60,1
4140 IF X>0 THEN LINE-(45,90),PR
ESET
4145 IF X>PI THEN LINE(45,57)-(4
5,123),PSET
4148 LINE(H,V)-(45,V),PRESET
4150 NEXT X
4160 GOSUB 6160
4170 CLS:PRINT:PRINT"   DEFINING
 THE TRIG FUNCTIONS  IN TERMS OF
 THE SIDES OF A RIGHTTRIANGLE IN
CLUDES ONLY THE ACUTEANGLES(<PI/
2).  THE DEFINITIONS MUST BE EXP
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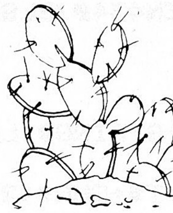

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```
ANDED IN TERMS OF A  CIRCLE."
4180 PRINT"   INSTEAD OF THE ADJ
ACENT SIDE,WE USE THE HORIZONTAL
 DISTANCE  BETWEEN THE CENTER OF
 THE CIRCLEAND THE END OF THE AR
C.";4190 PRINT"  INSTEADOF THE O
PPOSITE SIDE, WE USE THEVERTICAL
 DISTANCE BETWEEN THE   CENTER O
F THE CIRCLE AND THE ENDOF THE A
RC."
4260 GOSUB 6160
4270 CLS:T$="QUIZ":GOSUB 6000
4275 IF LEFT$(R$,1)="Y"THEN4050
4280 PRINT:PRINT"   THE COSINE O
F 0 IS THE SAME  AS THE COSINE O
F:"
4290 A$="PI":B$="2*PI":C$="PI/2"
:R$="B":GOSUB6060
4300 PRINT:PRINT"FOR VALUES OF X
 LESS THAN 0 AND GREATER THAN 2*
PI, THE GRAPH OF COS(X) CONTINUE
S IN THE SAME RE-PEATING CURVE.
WHAT VALUE DO YOUSUPPOSE THE COS
(3*PI) HAS?"
4310 A$="0":B$="1":C$="-1":R$="C
":GOSUB6060
4320 PRINT:PRINT"  HOW ABOUT COS
(-PI/2)?"
4330 A$="0":B$="1":C$="-1":R$="A
":GOSUB6060
4340 IF INKEY$=""THEN4340 ELSE 2
00
5999 '
6000 'TITLE ROUTINE
6010 PRINTCHR$(241)+STRING$(LEN(
T$),243)+CHR$(242)
6020 PRINTCHR$(245)+T$+CHR$(250)
6030 PRINTCHR$(244)+STRING$(LEN(
T$),252)+CHR$(248)
6035 IF T$="QUIZ"THEN INPUT"DO Y
OU WANT TO SEE THE DISPLAY  AGAI
N";R$
6040 RETURN
6050 'QUIZ ROUTINE
6060 PRINT:PRINTTAB(12)"A.  "+A$
6070 PRINTTAB(12)"B.  "+B$
6080 PRINTTAB(12)"C.  "+C$
6090 INPUT Q$:IF Q$<>R$ THEN 609
0
6100 PRINT"THAT'S RIGHT":PLAY"T4
A#L9EG#"
6111 RETURN
6150 'TURN-THE-PAGE ROUTINE
6160 I$=INKEY$
6170 IF I$="L" THEN 200
6175 IF I$=""THEN 6160
6180 RETURN
```

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Silly Syntax
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For 1 to 10 players. Load a story into the computer. The players are asked to supply a noun, verb, part of body, celebrity, etc. which the program uses to complete the story. The story, which is displayed when all words are entered, will be hilarious. Silly Syntax requires 16K Extended Basic (32K for disk version). For $19.95, you get a user guide and a tape containing the Silly Syntax game and 2 stories. You can create your own stories or order story tapes from the selection below.

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*TRS-80 is a trademark of Tandy Corp.

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RAINBOW CERTIFICATION SEAL

Software Review...

Ready, Aim, Duck: It's *Missile Barrage*

If you and five friends would like to have all-out war with each other, *Missile Barrage* may be your answer. The deployment scheme used in this video game makes just as much sense as any of the war tactics we read about in the paper, if not more sense. In *Missile Barrage*, everybody heads for the hills and digs in. The graphics provide for more than 60 mountain ranges and your silo/bunker is assigned randomly, as good a method as any. Then, you take turns firing missiles at each other until there's only one person left. That person is left alone on a pock-marked mountain top to lick his own wounds and make peace with himself. Sounds almost too plausible, doesn't it?

Missile Barrage is a thought-provoking game. The action, though, is slow at first because you have to think; it takes you a while to learn the strategy, which is to calculate the exact missile launching angles and just the right velocity to carry your warhead right into your enemy's lap. But, be forewarned, don't shoot at anybody that you don't plan to clobber on the first try; you may not get a second try. Landing close to someone can be very hazardous to your health, if your intended target is smart. You see, if he notes your launching angle and velocity and then you miss, he'll calculate the complementary angle and use your velocity plus a slight correction to make up for your mistake and then deliver a don't care package right back to you. How about them apples?(Oops, I said a no-no, didn't I?)

Don't get too worried about tipping off your enemy, though. One of the other four players you haven't even glanced at may send you both to Kingdom Come before either of you even have a chance to squeeze the trigger button. Then again, it's not too likely, because it's difficult to calculate the trajectories until everyone has had a good bit of practice. Young children, I think, would have a lot of trouble playing this game. Yes, I can hear it now: your wonderchild is only 2½ years old and wipes out all comers. Maybe so, but my mother's child has taught mathematics and he managed to self-destruct. I should know better than to admit this in print, but I decided to set the angle at 90 degrees and fire. Result: ask your 2½ year old— straight up and then straight back down, right on my own thick skull.

There are two versions of *Missile Barrage* on the cassette. One is a slow-playing version with sound, the other a faster version, but no sound. Both are 16K. You can use the *POKE 65495,0* command to double the microprocessor speed. Around*Rainbow*,this is known as the *speed-up POKE*, a contradiction in terms if ever there was one. But, even with the speed-up, *Missile Barrage* tends to bog down near the end of the game when only two or three combatants are left. This may have something to do with your combat readiness, because, by the last stages, you've probably had half the hillside and substantial parts of your missile site blown away. But, just because you see devastation all around you, don't let your guard down. You've got to keep a fire burning and stay alert at all times—even if your enemy has abandoned his base momentarily and is out of the room raiding the refrigerator. A missile launch malfunction may take place in your own backyard, triggering a red alert. If that happens, you'll have to take remedial actions in a matter of seconds or your own arsenal will light up your life with a vapo rub-out as you and your missile site get blown every which way but loose.

(Great X-P-T, P.O. Box 9212, Livonia,MI 48150, $10.95 on tape.)

—Jim Reed

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*All programs require Color ComputerTM (Tandy Corp.) or TDP System 100 ComputerTM (RCA Corp.).

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Software Review...

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If you follow the stock market, you may already know that one of the so-called "leading stock indicators" that news people frequently refer to is a look at what individual private investors are doing. It's an important indicator because individual investors, as a group, can be counted on to be wrong. If individual investors have been stampeded into selling, you can almost bet that the smart money will be on the phone yelling, "Buy! Buy!"

So, how do we get ahead of, instead of follow, the market? Well, if I stumble across that answer, I'll send everybody a postcard from Shangri-La. Meanwhile, a giant step in getting to know the market, or a given stock, is to examine long term performance. Maybe we can spot something cyclical and pull off the classic "buy low, sell high" *coup de easy street*.

A new tool for easily examining stock trends, and other financial doings, is *Fundgraf*, a stock market analysis program for 16K ECB. Even if you aren't Mr. or Ms. Big Bucks, you'll find this utility interesting, and casual observers will be impressed no end as you call up all sorts of file data and promptly graphically display it. Want to compare your money market fund's performance with the Dow Jones Industrial Average? It's a cinch. Then, compare both with the performance of a mutual fund you've been interested in by pressing a couple of keys and charting all three on the same graph. Wonder how Tandy Corporation compares with, say, Dreyfus No.9 Fund? Chart it out with *Fundgraf*. Written in Basic, *Fundgraf* can be easily modified to keep track of your favorite stocks.

Running the program is very simple. You pick the stock you wish to analyze from a name menu(Up to seven stocks. For more, you make a new file tape.), then you select from a sub menu what aspect you wish to review.

Fundgraf makes dividend adjustments and compares recent, or long since past, stock performance with annual growth rate guidelines. Or, you can pick another option and review "moving averages," how your stock is varying, week to week, from the annual growth guideline.

You want market advice? *Fundgraf* provides "buy" and "sell" signals. It uses the point at which the moving average crosses the price line to indicate a buy or sell signal. This,by the way, is a method commonly used by "telephone switch" advisory services. *Fundgraf's* author prefers to use the Thursday closing price as the weekly price, but if you're a Friday person, you're the boss;*Fundgraf* is your helper.

An important bonus is that *Fundgraf's* well-written documentation tells you what you need to know to personalize this utility. It also explains how to handle stock splits and other head-scratching situations.

Now, I'm not suggesting you're anything but a wheeler dealer, but, just in case you think of yourself as average, remember, the herd instinct can carry you right over the canyon wall. Maybe, we should determine what we think is the best possible move, and then do just the opposite. Practice what I preach? No way, Jose. At any rate, if you're tired of "playing" the stock market and want to get serious, *Fundgraf* is a very useful tool.

(Parsons Software, 118 Woodshire Drive, Parkersburg, WV 26101, $49.95 on tape.)

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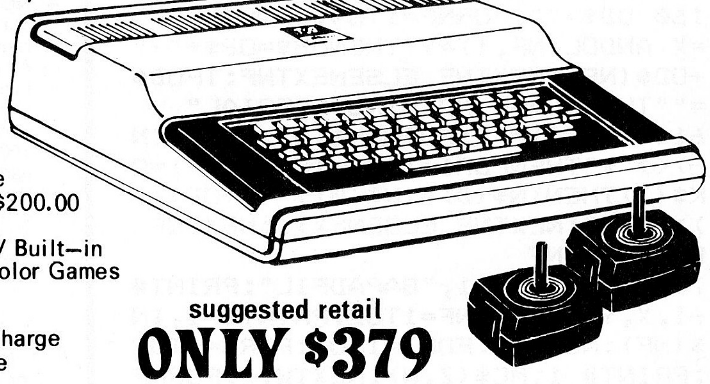

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Corrections

The following copy was left out of the *MEM EXAM* program in the ~~November~~ December issue. This affects only the Assembly Language version. The Basic version was correct as printed.

```
01330 TITLE     FDB $0D0D
01340           FCC /MEM EXAM/
01350           FCB $0D
01360           FCC /PRESS ANY KEY/
01370           FCB 0
01380           END START
```

Here are the listing changes which belong with the regular Listing in Geoff Wells December GAPAD feature (page 98, December *Rainbow*.

```
0 'ADD OR EDIT THE FOLLOWING LIN
ES TO TEST FOR TYPO'S
10 DIMMC$(2,2),IN$(2),FW$(40),SW
$(14),FC$(40),SC$(14),OL(4,1),OD
$(4),OK$(4)
20 FORNF=1TO2:IN$(NF)="*":NEXTNF
30 FORNF=1TO36:READDUMMY$:NEXTNF
40 FORNF=1TO40:READFW$(NF),FC$(N
F):NEXTNF
50 FORNF=1TO14:READSW$(NF),SC$(N
F):NEXTNF
60 FORX=1TO2:FORY=1TO2:READMC$(X
,Y):NEXTY,X
70 FORNF=1TO4:READOL(NF,0),OL(NF
,1),OD$(NF),OK$(NF):NEXTNF
120 FORNF=1TO5:READDUMMY$:IFL1=N
F THENL$=DUMMY$:NEXTNF ELSENEXTN
F
130 FORNF=1TO8:READDUMMY$:IFL2=N
F THENL$=L$+DUMMY$:NEXTNF ELSENE
XTNF
140 FORNF=1TO12:READDUMMY$:IFL3=
NF THENL$=L$+DUMMY$:NEXTNF ELSEN
EXTNF
150 FORNF=1TO11:READDUMMY$:IFL4=
NF THENL$=L$+DUMMY$:NEXTNF ELSEN
EXTNF
160 OB$="":FORNF=1TO4:IFOL(NF,0)
=X ANDOL(NF,1)=Y THENOB$=OB$+"-"
+OD$(NF):NEXTNF ELSENEXTNF:IFOB$
=""THENOB$=" NOTHING SPECIAL"
611 IN$(0)="":FORNF=1TO2:IFIN$(N
F)<>"*"THENFORI=1TO4:IFIN$(NF)=O
K$(I)THENIN$(0)=IN$(0)+"-"+OD$(I
):NEXTI:NEXTNF ELSENEXTI:NEXTNF
ELSENEXTNF
710 OPEN"O",-1,"GAPADFIL":PRINT#
-1,X,Y,SC:FORNF=1TO2:PRINT#-1,IN
$(NF):NEXTNF:FORZ=1TO2:FORW=1TO2
:PRINT#-1,MC$(Z,W):NEXTW,Z:FORNF
=1TO4:PRINT#-1,OL(NF,0),OL(NF,1)
:NEXTNF:CLOSE:GOTO100
810 OPEN"I",-1,"GAPADFIL":INPUT#
-1,X,Y,SC:FORNF=1TO2:INPUT#-1,IN
$(NF):NEXTNF:FORZ=1TO2:FORW=1TO2
```

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```
:INPUT#-1,MC$(Z,W):NEXTW,Z:FORNF
=1TO4:INPUT#-1,OL(NF,0),OL(NF,1)
:NEXTNF:CLOSE:GOTO100
1000 IN$(0)="":FORNF=1TO2:IFIN$(
NF)=RC$ THENIN$(0)="YOU ALREADY
HAVE THE "+RC$:NEXTNF ELSENEXTNF
1010 FORNF=1TO2:IFIN$(NF)="*"THE
NIN$(0)=STR$(NF):NEXTNF ELSENEXT
NF
1030 FORNF=1TO4:IFRC$=OK$(NF)AND
OL(NF,0)=X ANDOL(NF,1)=Y THENIN$
(VAL(IN$(0)))=OK$(NF):OL(NF,0)=-
1:OL(NF,1)=-1:IN$(0)="":NEXTNF E
LSENEXTNF
1100 IN$(0)="":FORNF=1TO2:IFIN$(
NF)=RC$ THENIN$(0)="*":IN$(NF)="
*":FORCK=1TO4:IFOK$(CK)=RC$ THEN
OL(CK,0)=X:OL(CK,1)=Y:NEXTCK ELS
ENEXTCK:NEXTNF ELSENEXTNF
10000 DATA IN ,ON ,BELOW ,BESIDE
 ,FACING
10010 DATA A DARK ,A DAMP ,A TWI
STING ,A LARGE ,A SMALL ,A HUGE
,A TINY ,A SINISTER
10020 DATA DARK ,DAMP ,DUSTY ,SI
NISTER ,SHALLOW ,DEEP ,SMELLY ,F
OWL SMELLING ,FOGGY ,PLEASENT ,S
UNNY ,RAT INFESTED
10030 DATA ROOM,PASSAGE,CORRIDOR
,RIVER,LAKE,PIT,BEDROOM,DUNGEON,
STAICASE,LIBRARY,KITCHEN
30000 DATA LAM,ABCJOQV,SWO,ABCJO
Q,GOB,ABCJQ,RIN,ABCJOQ,DOO,CDEFH
IJQU,TAB,CJQUV,CHA,CJQUV,DES,CEF
HIJQUV,HAT,ABCJMQ,GLA,ABCJQV,LEV
,CJQ,BOO,ABCEFJNQ,GAT,CEFHIJQU,H
AN,CJPQ
40000 DATA *SE***02030809,N*E***
03071211,*S*W**05040605,N**W**01
020303
50000 DATA 1,1,A SMALL GOLDEN RI
NG,RING,1,2,A JEWEL ENCRUSTED MA
GIC SWORD,SWORD,2,1,A BOOK OF MA
GIC SPELLS,BOOK,2,2,A SILVER GOB
LET FILLED WITH WINE,GOBLET
```

Software Review...

This Eat-And-Run Is 4K Fun

Color Scarfman is something unusual, a machine language game for the 4K 80C. People with 16K should take a good look at this maze-gobble game; don't let the fact that it was made for the 4K machine stop you!

The graphics in *Color Scarfman* are very well done, although in one of the lower resolution modes. The *Scarfman* looks like a square "c," and the monsters look a little block-like. But, they move quite smoothly, and you soon forget how they look as you get into the game.

The maze is very compact, but surprisingly easy to move through (but not too easy, though). Movement is a bit restricted in the area around the center power "+." The monsters turn blue when eaten, but their change in status helps keep the game from getting too easy.

Because it's made to work on a 4K machine, there's only one level of play -- hard. The game gets harder with each new board, so it's far from easy to master.

Color Scarfman has on-screen scoring, and also, what more games should have, an option for using the keyboard instead of the joysticks, if you like.

I had my doubts at first that a *Pac-Man* type game made to run on a 4K 80C would be challenging enough for me. But *Color Scarfman* met, and exceeded, my expectations!

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Utility...

*Sign*Up And Have A *Banner* Day

16K
ECB

by David Steyer

Did you try my screen print program in the September *Rainbow*? Those among you who did may recall my mentioning that you could also use the program to print banners. And, you can. But, while you can use it for that purpose, it wasn't designed with that use specifically in mind. Thus, it could prove clumsy at times. That's why I've written *Banner*, a fair-sized, flexible program that easily creates giant-letter banners on your fanfold printer paper.

Banner uses the full ASCII character set on either 80- or 132-column printers. It also features height and width control as well as an optional inverse function.

The program is self-explanatory, so, even if you're just learning to use your new Christmas-gift printer you gave yourself, key in this program and be the first in your neighborhood to write a block-long banner. A *really* long banner would require running the program over and over, but, theoretically, the banner could be as long as your paper—500 sheets, about 500 feet of banner. That would be a chore, but a nice six-foot banner is a piece of cake with *Banner*. It might be just the thing to use to say thank you to those who gave you computer stuff for Christmas.

There is a drawback to *Banner* though. It's fairly obvious that it has the potential to be a paper hog if your message is a long one. Let's say you want to write "THANK YOU VERY MUCH, AUNT MABEL AND UNCLE GEORGE FOR THE BEAUTIFUL NECKTIE! IT'S JUST WHAT I ALWAYS WANTED." With a good supply of paper and a good supply of patience, you could add a paragraph or two and make a banner long enough to reach to their house—even if it's in the next state. Novel, but impractical.

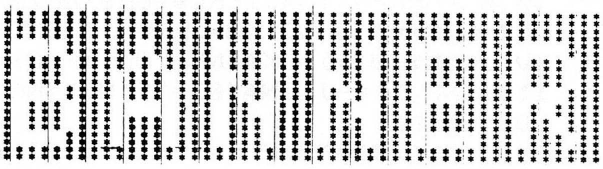
Your solution is *Sign*, which will make—what else—signs. Little signs, bigger signs, but not as big as *Banner*. Making computer signs is fun and easy to do. I'll leave it to your imagination as to what to write. Just follow the prompts on the on-screen instructions.

A couple of program notes. Yes, both programs which follow will work with non-graphic printers; that's the idea—to produce graphic displays on non-graphic machines. Of course, these listings will be helpful for those with graphics printers, too. As written, however, the *Sign* program won't work on Radio Shack's Line Printer VII or L.P. VIII.

We used an Epson MX-80F/T to print the greatly reduced samples which appear at the beginning of each listing, but we are confident that many other printers can be used, too.

So, give it a go. Stock in a freightcar load of paper and maybe you'll get your name in the Guiness Book of World Records, . . . for something.

The listings:



```
60 CLEAR 250
70 DIM A$(3),D$(4),E$(6)
80 GOSUB 580
90 CLS:PRINT"* B A N N E R * BY
DAVID STEYER "
100 INPUT"80 OR 132 COLUMN PRINT
ER (8/13)";LG:IF LG=8 THEN LG=80
 ELSE IF LG=13 THEN LG=132 ELSE
100
110 PRINT"CHARACTER HEIGHT ( 1 -
";INT(LG/10)")";:INPUTHH:IF HH<1
 OR HH>INT(LG/10) THEN 110
120 PRINT"CHARACTER WIDTH ( 1 -
10 )":IF LG=80 THEN PRINT"(5 OR
LESS RECOMMENDED)
130 INPUTWD:IF WD<1 OR WD>10 THE
N 120
140 INPUT"INVERSE (Y/N)";Y$:IF Y
$="Y" THEN Y$=" " ELSE Y$="1"
150 PRINT"ENTER BANNER TEXT (32
CHARACTER LIMIT)"
160 LINEINPUT TX$
170 IF TX$="" OR LEN(TX$)>32 THE
N 150
180 A$=A$(RY)
```

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```
190 PMODE4,1:PCLS1:SCREEN 1,0
200 IF Y$=" " THEN PCLS0
210 FOR I=1 TO LEN(TX$)
220 A=ASC(MID$(TX$,I,1))-32
230 IF A<24 THEN RY=0 ELSE IF A<
47 THEN RY=1 ELSE IF A<70 THEN R
Y=2 ELSE RY=3
240 A=A-(RY*23)
250 FOR X=0 TO4
260 IF A=0 THEN Y=0:GOTO 280
270 Y=VAL("&H"+MID$(A$(RY),((A-1
)*10)+(X*2)+1,2))
280 D$(X)="        "
290 IF Y>127 THEN Y=Y-128:D$(X)=
"1       "
300 IF Y>63 THEN Y=Y-64:D$(X)=LE
FT$(D$(X),1)+"1      "
310 IF Y>31 THEN Y=Y-32:D$(X)=LE
FT$(D$(X),2)+"1     "
320 IF Y>15 THEN Y=Y-16:D$(X)=LE
FT$(D$(X),3)+"1    "
330 IF Y>7 THEN Y=Y-8:D$(X)=LEFT
$(D$(X),4)+"1   "
340 IF Y>3 THEN Y=Y-4:D$(X)=LEFT
$(D$(X),5)+"1  "
350 IF Y>1 THEN Y=Y-2:D$(X)=LEFT
$(D$(X),6)+"1 "
360 IF Y>0 THEN D$(X)=LEFT$(D$(X
),7)+"1"
370 NEXT X
380 E$(0)=LEFT$(D$(0),5)
390 E$(1)=RIGHT$(D$(0),3)+LEFT$(
D$(1),2)
400 E$(2)=MID$(D$(1),3,5)
410 E$(3)=RIGHT$(D$(1),1)+LEFT$(
D$(2),4)
420 E$(4)=RIGHT$(D$(2),4)+LEFT$(
D$(3),1)
430 E$(5)=MID$(D$(3),2,5)
440 E$(6)=RIGHT$(D$(3),2)+LEFT$(
D$(4),3)
450 FORX=0 TO 6:FOR Y=1 TO 5
460 IF MID$(E$(X),Y,1)=Y$ THEN P
RESET(Y+(I-1)*8,3+X) ELSE PSET(Y
+(I-1)*8,3+X)
470 NEXT Y,X
480 NEXT I
490 FOR I=LEN(TX$)*8 TO 0 STEP-1
500 FOR Y=1 TO 10
510 IF PPOINT(I,Y)=0 THEN B$=B$+
STRING$(HH,"*") ELSE B$=B$+STRIN
G$(HH," ")
520 NEXTY
530 FOR R=1 TO WD:PRINT#-2,STRIN
G$(INT(LG-LEN(B$))/2,32);B$:NEXT
 R
540 B$=""
550 NEXT I
560 PRINT#-2,"     * B A N N E R
*  BY: DAVID STEYER 1982   RAINB
OW MAGAZINE";STRING$(10,10)
```

™TRS80 color

From the January 1981 issue of the CSRA Computer Club newsletter

There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer™. Devoted to SS-50 6800 and 6809 machines up to now. 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

NOTE: This and other interesting and needed articles for the Radio Shack TRS-80 color computer™ are being included monthly in 68 Micro Journal—The Largest specialty computer magazine in the world!

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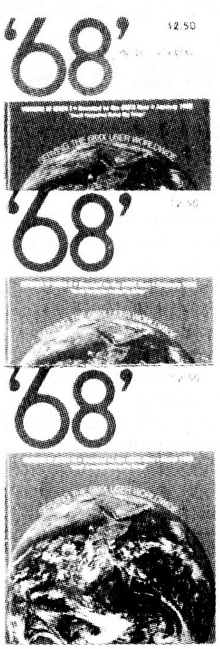

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Currently, and even before the Color Computer™ hit the stores, **68 Micro Journal™** was devoting more space to the TRS-80C Color Computer™ and information concerning the Motorola 6809 (which is the CPU in the Color Computer™) than ANY OTHER Computer Magazine. Examples include:

REVIEWS of the three major Disk Control Systems for the Color Computer™, most of the Monitors, Assemblers, and Disassemblers, Word Processors and Editors, "Terminal" Programs (for use with Modems, Communications with other Computers, etc.), and of course, Games.
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DISCUSSIONS of the 6883 Synchronous Address Multiplexer, using the Color Computer™ with 64K and 96K memory (which it is ALREADY capable of handling), thoughts on Programming, etc.

I suggest that you subscribe to **68 Micro Journal™**, SOON, as many back issues are sold-out.

We still, and will continue to, lead in the type information you need to **FULLY UTILIZE** the **POWER** of the **6809 in the Radio Shack TRS-80 Color Computer™.**

Bob Nay
Color Computer Editor

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```
570 END
580 A$(0)="6318C0318052800000000
2B60DA8007568E2D5C0C644444C60452
88AC9A0111000000000888420820820 84
22200011DF710000109F210000000C61
1000001F0000000000031800044444 00
074675CC5C023084211C074426443E07
44260C5C01195F10840FC21E0C5C0746
1E8C5C0FC44442100"
590 A$(1)="7462E8C5C07462F0C5C00
3180630006300C61100088882082000 3
E0F8000820822220074444200807442D
AD98022A31FC620F463E8C7C07461084
5C0F46318C7C0FC21E843E0FC21E8420
074610BC5C08C63F8C62071084211C03
8842149808CA98A4A208421084 3E08EE
B58C6208C7359C620"
600 A$(2)="746318C5C0F463E842007
4631ACDE0F463EA4A207460E0C5C0F90
8421080 8C6318C5C08C6318A8808C635
AEE208C544546208C5442108 0F844E44
3E0390842 10E00410410400E10842138
023AA4210800111F41000000000000000
01C17C5E0843D18C5C0001F0841E0085
F18C5C0001D1F41C0"
610 A$(3)="0191E42100001F1785C08
43D18C62020184211C01004214980842
32E4A2061084211C0003D5AD6A0003D1
8C620001D18C5C0003D1F4200001F178
4200003D184200001F0707C0023C8420C
0002318C5C0002318A880002B5AD5C00
022A22A2000231784C0003E2223E0"
620 RETURN
```

SIGN ON THE DOTTED LINE

```
60 CLEAR 250
70 DIM A$(3),D$(4),E$(6)
80 GOSUB 550
90 CLS:PRINT" * S I G N *   BY:
DAVID STEYER "
100 INPUT"80 OR 132 COLUMN PRINT
ER (8/13)";LG:IF LG=8 THEN LG=80
 ELSE IF LG=13 THEN LG=132 ELSE
100
110 INPUT"HOW MANY LINES";LN:IF
LN<1 THEN 110 ELSE IF LN>10 THEN
 PRINT"ARE YOU SURE YOU WANT"LN"
LINES";:INPUT Z$:IF LEFT$(Z$,1)<
>"Y" THEN 110
120 DIMTX$(LN):PRINT:PRINT"ENTER
```

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AND NOW . . .
A WORD FROM THE SPONSOR

To me, one of the most enjoyable parts of Radio Shack's monthly sale flyers in years past was always the short column entitled *Flyerside Chat* by Lew Kornfeld, Radio Shack's president. Now that Mr. Kornfeld has retired, I miss those monthly little chats, for they always brightened up an otherwise dry flyer.

To continue the tradition, I've decided to cheer up our dry Star-Kits ad with my own little chat each month. Until some of you come up with a better title, I'll call it *A Word From the Sponsor.* (In fact, here is the formal announcement of a contest: the reader suggesting the best title for this column by March 15th, 1983 will win one free program of his choice from the Star-Kits catalog. If the winner has already purchased the program he wants he will receive twice the list price of the program. Our decision in choosing a winner is final. Hope that adds a bit of life to these advertisements for a while!)

Star-Kits is paying this magazine to bring you this column for two reasons. First of all, as many readers of my *Kilobaud Klassroom* and *Thoughts on 68xx Systems* series in MICROCOMPUTING Magazine may remember, I love to write articles. But I also like the opportunity to tell you a bit about Star-Kits products. Though I could do that in a regular article, I don't feel it's right to use the editorial pages of a magazine to blow your own horn.

In the coming months, I will include here a variety of useful information about our programs, and about the Color computer in general. With that as a beginning, here goes.

Here is an interesting use for PRINT #. The Basic manual explains that PRINT outputs to the screen, PRINT #-2 is for the printer, and PRINT #-1 is used for a tape file. What it doesn't say is that (a) PRINT #0 outputs to the TV Screen just as a plain PRINT does, and (b) that a variable can be used after the # sign.

This means that a statement like PRINT #P will output to the screen if P equals 0, but print on the printer if P equals -2.

We use this feature in our CHECK 'N TAX home accounting program. At the beginning of the program, we have the statements

```
100 INPUT "OUTPUT TO TV OR PRINTER?"; A$
110 A$ = LEFT$ (A$,1)
120 IF A$ = "T" THEN P= 0 : GOTO 140
130 IF A$ = "P" THEN P= -2 ELSE GOTO 100
```

This sets P equal to 0 for TV screen output, or -2 for output to the printer. Later on, we use PRINT #P, and the computer outputs to the desired device.

This trick can also be used for testing programs which use disk or tape files. Use PRINT #P for outputting to the file, but let P equal 0 for testing purposes. Later change it to -1 for tape or +1 for disk.

Next time I'll try to provide more useful tidbits about our favorite computer. In the meantime, if you have any topics you'd like discussed, drop me a note.

If you need information about any Star-Kits product, the manual is available for $5 (except STAR-DOS whose manual is $10). If you buy the manual, we will give you credit for its price toward a future order.

See you next month . . .

Peter A Stark

SPELL'N FIX

Regardless of whose text processor you use, let SPELL 'N FIX find and fix your spelling and typing mistakes. It reads text faster than you can, and spots and corrects errors even experienced proofreaders miss. It is compatible with all Color Computer text processors, including Telewriter and Radio Shack's Scripsit! (See the review in 80 Micro, November 1982.) $69.29 in the Radio Shack disk or cassette versions; $89.29 in the Flex version. (20,000 word dictionary is standard; optional 75,000 word Super Dictionary costs $50 additional.)

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A complete monitor and debugging system which lets you input programs and data into memory, list memory contents, insert multiple breakpoints, single-step, test, checksum, and compare memory contents, find data in memory, start and stop programs, upload and download, save to tape, connect the Color Computer to a terminal, printer, or remote computer, and more. HUMBUG on disk or cassette costs just $39.95.

STAR—DOS

A Disk Operating System specially designed for the Color Computer, STAR-DOS is fully compatible with your present Color Computer disk format — it reads disks written by Extended Disk Basic and vice versa. But with STAR-DOS you can use machine and assembly language programs to do things Basic can't. Just $49.95.

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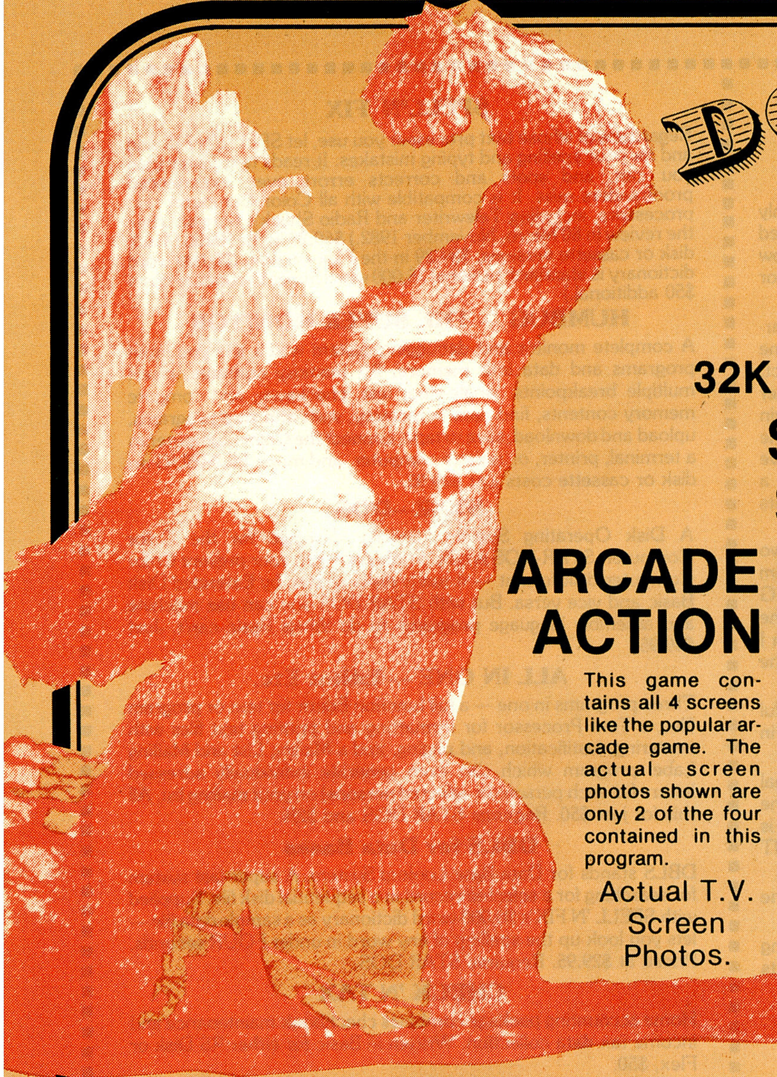

DONKEY KING

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(C) 1982

32K Machine Language

$24.95 TAPE

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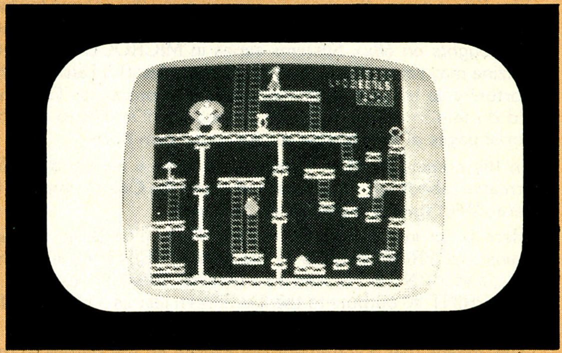
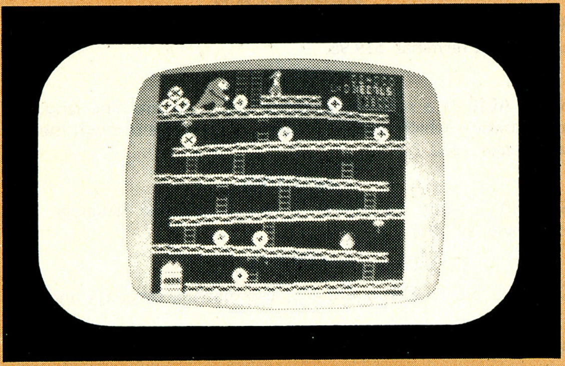
ARCADE ACTION

This game contains all 4 screens like the popular arcade game. The actual screen photos shown are only 2 of the four contained in this program.



Actual T.V. Screen Photos.

How high can you climb? Plays like the popular arcade game!



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```
 TEXT ("INT((LG-2)/7)"CHARACTERS
 PER  ROW )":PRINT"         "+STRI
NG$(INT((LG-2)/7),"*")
130 FORI=1 TO LN
140 PRINT"LINE"I;:LINE INPUT TX$
(I):IF LEN(TX$(I))>INT((LG-2)/7)
 THEN PRINT"TOO LONG, TRY AGAIN"
:GOTO 140 ELSE IF TX$(I)="" THEN
 TX$(I)=" "
150 NEXT I
160 A$=A$(RY)
170 PMODE4,1:PCLS1:SCREEN 1,0
180 LINE(0,0)-(LG-1,LN*8+2),PRES
ET,B
190 FORJ=1 TO LN
200 FOR I=1 TO LEN(TX$(J))
210 A=ASC(MID$(TX$(J),I,1))-32
220 IF A<24 THEN RY=0 ELSE IF A<
47 THEN RY=1 ELSE IF A<70 THEN R
Y=2 ELSE RY=3
230 A=A-(RY*23)
240 FOR X=0 TO4
250 IF A=0 THEN Y=0:GOTO 270
260 Y=VAL("&H"+MID$(A$(RY),((A-1
)*10)+(X*2)+1,2))
270 D$(X)="        "
280 IF Y>127 THEN Y=Y-128:D$(X)=
"1       "
290 IF Y>63 THEN Y=Y-64:D$(X)=LE
FT$(D$(X),1)+"1      "
300 IF Y>31 THEN Y=Y-32:D$(X)=LE
FT$(D$(X),2)+"1     "
310 IF Y>15 THEN Y=Y-16:D$(X)=LE
FT$(D$(X),3)+"1    "
320 IF Y>7 THEN Y=Y-8:D$(X)=LEFT
$(D$(X),4)+"1   "
330 IF Y>3 THEN Y=Y-4:D$(X)=LEFT
$(D$(X),5)+"1  "
340 IF Y>1 THEN Y=Y-2:D$(X)=LEFT
$(D$(X),6)+"1 "
350 IF Y>0 THEN D$(X)=LEFT$(D$(X
),7)+"1"
360 NEXT X
370 E$(0)=LEFT$(D$(0),5)
380 E$(1)=RIGHT$(D$(0),3)+LEFT$(
D$(1),2)
390 E$(2)=MID$(D$(1),3,5)
400 E$(3)=RIGHT$(D$(1),1)+LEFT$(
D$(2),4)
410 E$(4)=RIGHT$(D$(2),4)+LEFT$(
D$(3),1)
420 E$(5)=MID$(D$(3),2,5)
430 E$(6)=RIGHT$(D$(3),2)+LEFT$(
D$(4),3)
440 FORX=0 TO 6:FOR Y=1 TO 5
450 IF MID$(E$(X),Y,1)="1" THEN
PRESET(Y+(I-1)*7+2,2+X+(J-1)*8)
460 NEXT Y,X
470 NEXT I
480 NEXT J
490 FOR Y=0 TO LN*8+2
500 FOR X=0 TO LG-1
510 IF PPOINT(X,Y)=0 THENPRINT#-
2,"O"+CHR$(8)+"+"+CHR$(8)+"#"; E
LSE PRINT#-2," ";
520 NEXT X,Y
530 PRINT#-2,"       * S  I  G  N
 *      BY: DAVID STEYER 1982   R
AINBOW MAGAZINE";STRING$(10,10)
540 END
550 A$(0)="6318C031805280000000
2B60DA80075 68E2D5C0C644444C60452
88AC9A01110000000008884208208208 4
222000 11DF7100001 09F2100000000C61
1000001F000000000003180000444440 0
074675CC5C0230842 11C074426443E07
44260C5C011 95F10840FC21E0C5C0746
1E8C5C0FC44442100"
560 A$(1)="7462E8C5C07462F0C5C00
318063000630 0C611000888208200 03
E0F8000820822220074444200807442D
AD98022A31FC620F463E8C7C07461084
5C0F46318C7C0FC21E843E0FC21E8420
074610BC5C08C63F8C62071084211C03
8842149808CA98A4A2084210843E08EE
B58C6208C7359C620"
570 A$(2)="746318C5C0F463E842007
4631ACDE0F463EA4A207460E0C5C0F90
842108 08C6318C5C08C6318A8808C635
```

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```
AEE208C544546208C54421080F844E44
3E039084210E00410410400E10842138
023AA4210800111F4100000000000000
01C17C5E0843D18C5C0001F0841E0085
F18C5C0001D1F41C0"
580 A$(3)="0191E42100001F1785C08
43D18C62020184211C01004214980842
32E4A20610842 11C0003D5AD6A0003D1
8C620001D18C5C0003D1F4200001F178
420003D184200001F0707C0023C8420C
0002318C5C0002318A880002B5AD5C00
022A22A2000231784C0003E2223E0"
590 RETURN
```

Software Review...

CoCo Slots Draws A Three-Cherry Review

One of the first things that struck this reviewer about *CoCo Slots* is that it accepts only silver dollars. On my rare visits to gambling territories, I've always searched for the nickel slot machines—usually quite in vain, but the dollar machine....gulp. *CoCo Slots*, if you haven't guessed by now, is a slot machine program and is as well done a computerized one-armed bandit as I can imagine. Wonder how it would go over in Nevada and New Jersey? Well, here at *the Rainbow*, it went over great, until someone suggested making a modest wager to heighten the interest. I think the same thought occurred to all of us at once: "Is this thing an illegal gaming device in this state? Put somebody at the front door as a lookout; we may get raided." Really, I did have the feeling that maybe I was doing something I shouldn't, but that didn't stop me; *CoCo Slots* is fun.

CoCo Slots accepts three commands: hitting the "R" key gives you a selection of three different screens, each with a radically different color scheme; you punch the "I" key to insert silver dollars, which plunk down and stack up as you add extra coins to improve the odds. Then the space bar is used to play the machine. Thus, we may one day have space-bar bandits collecting electronically from our savings account or, conversely, depositing funds in our Swiss bank account.

I definitely prefer the black-background screen, but some who don't see a green screen as often as I do like it because, according to my wife, "It's the same color as money." We all agree that, in play, *CoCo Slots* does seem to spin around just like the traditional machines. Visually, we think it's hard to beat. On the minus side, though, we miss the satisfying sound of clinking coins on the payoffs—there could be more excitment with more sounds, bells, whistles, sirens.

Just like the mechanical machines, *CoCo Slots* is attractive because you don't have to know any strategy to play...do you? I mean, does anybody really believe that "putting a little English" on the lever will lead to bigger and better payoffs? Well, all I can say is that the last time I saw Dr. Doom, he was giving the space bar a sort of grazing Karate chop and he was winning big according to his on-screen bank balance.

If the cops don't get you, this is one nicely done game that just might pay for itself. I didn't see a thing, your honor, and I can't even speak machine language.

(COCOPRO, P.O. Box 37022, St. Louis, MO 63141, $9)

Jim Reed

the
Naked Gamer

If you think strip poker sounds like fun, read on. Actually, the name of this program package is not completely accurate. Only one player will end up completely undressed. These games are for the adventurous couple!!

The two games are good by themselves, but in the right company they can be terrific. The first is called **Strip Tails,** and is an arcade game played by two players simultaniously. You will need quick hands on the joystick and a quick grasp of the tactics to win, and if you lose, you could really lose your shirt. The other game is called **Sex,** and is something like Mastermind™. Both the player and the computer choose a three letter word, and the player has to guess the computer's word before the computer can guess the player's.

At the end of each round of either game, the computer will instruct one of the players, by name, to remove a specific item of their clothing. Don't worry, there isn't anything obscene in these programs. (Remember, you are choosing a THREE letter word.) On the other hand, the RESULTS from playing could be interesting indeed, and the games are really good even if you elect to keep your clothes on. Available on **TAPE** for **$21.95,** or on **DISK** for **$26.95.** You will like these!!!

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Hardware Review...

Two Interfaces Expand CoCo's Powers

By Dr. Laurence D. Preble

The Radio Shack Color Computer has enjoyed increasing popularity in recent months. One explanation is that it is an incredibly capable machine in its own right. Another factor is the amazing amount of support from independent software houses and manufacturers of compatible peripherals. The TRS-80C is not just for games anymore.

The Color Computer can use and control a myriad of peripheral devices -- modems, printers, digitizers, plotters and yes, game cartridges -- but not usually more than one at a time. Not until now, that is.

General Automation and Basic Technology are two companies that have recently released expansion interfaces for the Color Computer. The two interfaces are quite different in design, but both allow simultaneous use of add-on devices.

The CX-P1 by General Automation.

The CX-P1 serves a dual purpose. The simplest use is a convenient support for your television or monitor. It is fabricated with a strong aluminum chassis which allows the Color Computer to slip underneath while the TV sits on top. More importantly, the device comes with a parallel port for your printer, leaving the RS-232 port available for a modem or other serial add-on. A supplied software patch tells Basic to dump all its printer output to the parallel port. We plugged a 200 character-per-second parallel printer into the CX-P1 and it ran at full tilt! The unit has an expansion port which can select up to seven more peripheral cards. General Automation has promised to release additional I/O cards, a speech synthesizer board, and a 12-bit A/D card.

The CX-P1 has an extension cable that plugs into the Color Computer's cartridge slot. By the way, the plug on the cable is much smaller than a disk controller so that it does not protrude as if the computer had been stabbed by a spear. Disk drives may be plugged into a connector on the main chassis of the unit. A special circuit inside the CX-P1 allows a 32K (Rev-E) Color Computer to expand to 64K without internal modification.

The documentation supplied was brief but adequate. Most of the documentation was reasonably easy to understand. One exception is the section on the technical aspects of the CX-P1. While the supplied technical information is of great use to those who wish to design their own add-ons, the novice is cautioned that this material is not for him. A familiarity with the inner workings of the Color Computer is mandatory for complete understanding of the technical documentation. Most users will want to skip this section and simply follow the easy-to-read installation instructions.

The BT-1000 by Basic Technology

The BT-1000 is a more complex device that will support various configurations of memory and input/output devices. The unit occupies a desk area about 15 inches by eight inches. It is not intended that you set a TV on top of it; however, the BT-1000 does appear well-constructed, with a quality double-sided circuit board and gold-plated connectors. The device has a buffered cable that plugs into the Color Computer's cartridge slot. The main box contains its own power supply, thereby minimizing the power drain on the Color Computer.

Internally, the BT-1000 will support individually or in combination up to 8K of RAM or ROM. This is helpful for those who wish to keep a favorite monitor or machine language routine up in high memory. Additionally, the BT-1000 will accept up to five plug-in cartridges that are Radio Shack compatible. I should emphasize here that the BT-1000 is not a switching device for cartridges. All five cartridge slots are activated at once; therefore, it is not possible to plug in five game cartridges and selectively activate one at a time. If five game cartridges were simultaneously plugged in, they would all fight for the same chunk of memory causing great confusion to the Color Computer. Avoid fights! Plug in only those cartridges that do not require the same block of memory. (Most ROM Pack cartridges try to grab the memory locations between &HC000 and &HDFFF.) Some examples of compatible cartridges could include an extra serial port, a parallel port, a real time clock and yes, a game cartridge.

What if I want to copy a ROM cartridge directly to disk? The ROM cartridge would try to grab the same memory locations as the disk controller. Fortunately, the BT-1000 does have a sneaky way of getting around the problem. By flipping a few switches, it is possible to force the ROM cartridge to grab a higher chunk of memory. If the cartridge usually occupied memory starting at &HC000, then it would now occupy memory beginning at &HE000. Since the new location does not conflict with the Disk Operating System, you could tell Basic to save the new block of memory to disk without any hassle. If the ROM Pack contains machine language code that is written so that it will run anywhere in memory, then it may also be possible to *EXEC* the ROM program up at its new location.

Basic Technology was also kind enough to supply us with their BT-1020 Time of Day Clock which can be plugged directly into the Color Computer or can be used with the BT-1000 box. The clock is supplied with software that appears to work as advertised. The clock features a calendar with day of week, leap year compensation and automatic adjustment for daylight savings time. Also included is an alarm circuit and variable timer pulse cycle and a NiCad battery to keep it alive when the computer is off.

Currently, the documentation for the BT-1000 is written for the more technically oriented user; it requires considerable study for full comprehension. Nonetheless, Basic Technology promises to provide assistance to the novice—by phone or letter.

***CX-P1*, General Automation, 9600 Roosevelt Blvd., Suite 100-LL, Philadelphia, PA 19115, $199.95; *BT-1000*, Basic Technology, Dept. Q, P.O.Box 511, Ortonville, MI 48462, $270.00; with 8K RAM $300.00, BT-1020 Clock/Calendar, $109.00.**

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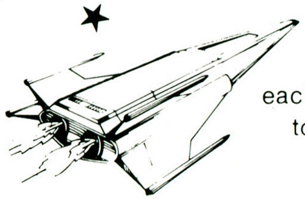

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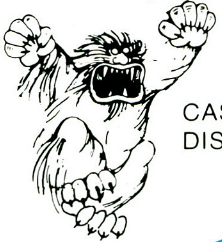

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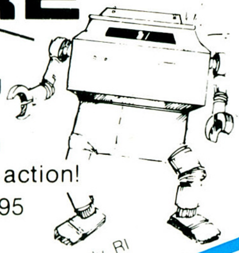

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